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QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

(STAGE 2 AND STAGE 3)

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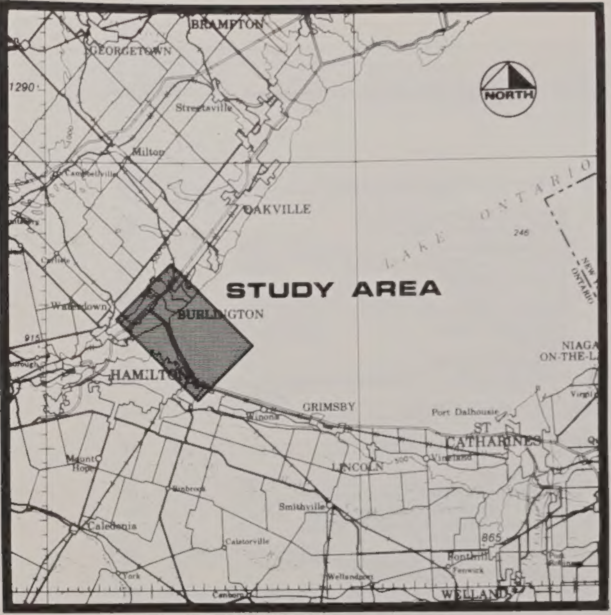

QUEEN ELIZABETH WAY

(STAGE 2 AND STAGE 3 REDEVELOPMENT)

GUELPH LINE TO HIGHWAY 20

W.P. 83 - 74 DISTRICT 4

15·4 km

ENVIRONMENTAL ASSESSMENT REPORT

CITY OF BURLINGTON
REGIONAL MUNICIPALITY OF HALTON
CITY OF HAMILTON
REGIONAL MUNICIPALITY OF HAMILTON - WENTWORTH

MAY 1982

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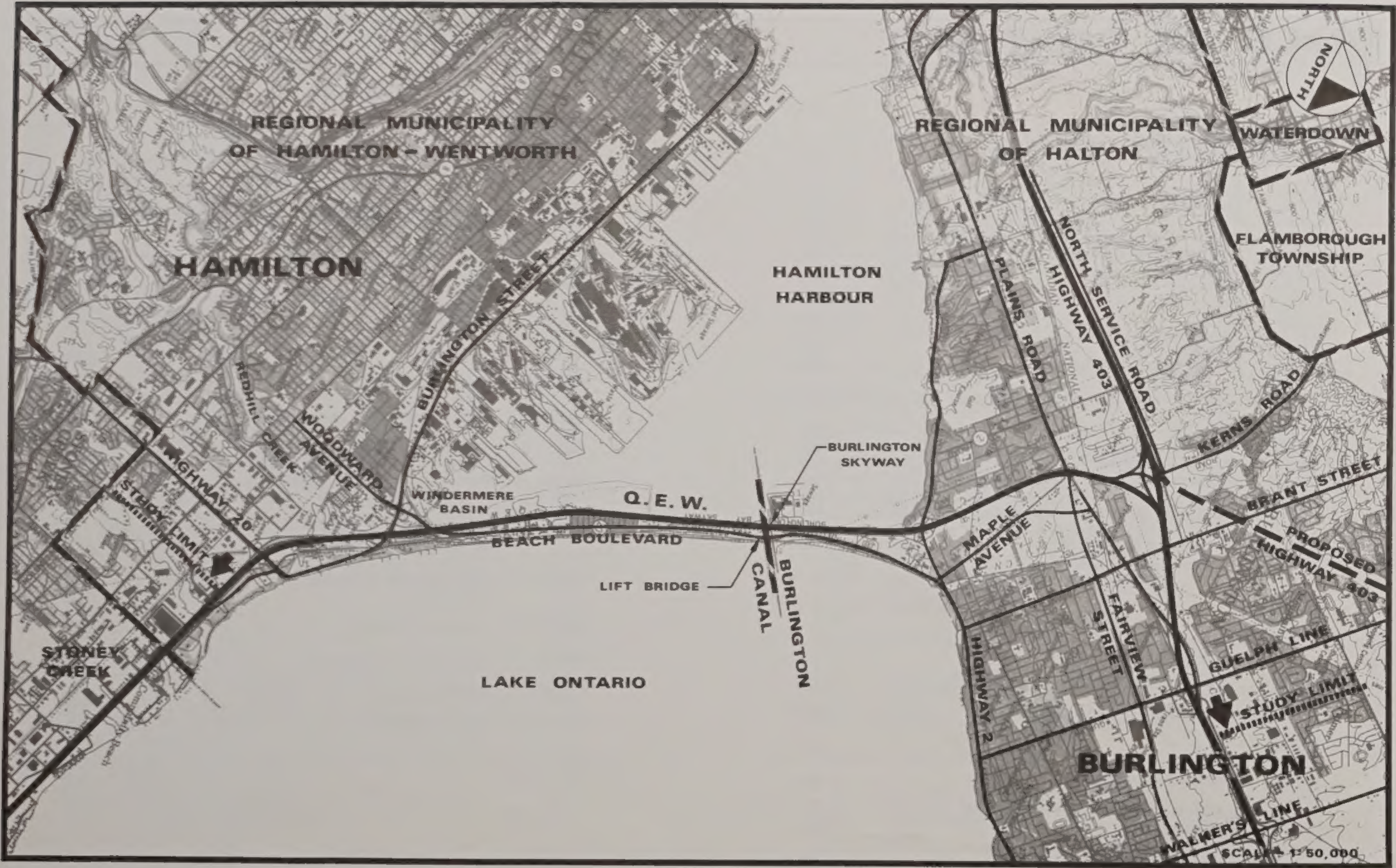
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PROPOSED HIGHWAY 403
BURLINGTON STREET
REDHILL CREEK
WOODWARD AVENUE
HIGHWAY 20
STUDY LIMIT
WINDERMERE BASIN
Q. E. W.
BURLINGTON SKYWAY
BEACH BOULEVARD
LIFT BRIDGE
BURLINGTON CANAL
MAPLE AVENUE
FAIRVIEW STREET
HIGHWAY 2
GUELPH LINE
STUDY LIMIT
STONEY CREEK
LAKE ONTARIO
BURLINGTON
WALKER'S LINE
SCALE 1: 50,000

KEY PLAN

INTRODUCTION AND BACKGROUND

1.1 ENVIRONMENTAL ASSESSMENT REPORT/ APPROVALS REQUESTED

This report documents a planning study that has been carried out for Stage 2 and Stage 3 of the three stage redevelopment of the Queen Elizabeth Way between Guelph Line in Burlington and Highway 20 in Hamilton. See Key Plan and figure 1. The study included the investigation of a new crossing of the Burlington Canal.

This proposed redevelopment of the Queen Elizabeth Way represents a major reconstruction project and as such is categorized, within the Ministry of Transportation and Communications, as a group "A" project (as opposed to smaller routine projects that are categorized as group 'B' or group 'C' projects). The Environmental Assessment Act, 1975 requires the Ministry of Transportation and Communications to submit an individual Environmental Assessment, on projects of this nature, to the Ministry of Environment.

As a result of discussions between the Ministry of Transportation and Communications and the Ministry of Environment, this Environmental Assessment has been prepared as a one step submission rather than as a two step (Type I and Type II) submission as per the Ministry of Transportation and Communications' normal procedure. This one step Environmental submission covers the planning and preliminary design phase of the project with general comments on residual environmental concerns and mitigation measures.

This present report is being submitted to the Ministry of Environment to request approval for the planning, design, construction, operation and maintenance of the Stage 2 redevelopment of the Queen Elizabeth Way as described generally in section 1.4 and section 5 of this report and as illustrated in Appendix I. Subsequent "design and construction" reports for Stage 2 will be provided for information and monitoring purposes. These reports will be submitted immediately prior to construction and will be prepared in accordance with the outline for Chapter 5 of the Ministry of Transportation and Communications' Class Environmental Assessments.

In addition, approval is being requested, i.e. approval to designate and to protect/acquire property, for the Stage 3 redevelopment of the Queen Elizabeth Way which is also described in section 1.4 and section 5 of this report and illustrated in Appendix I. The Stage 3 improvements will be carried out in accordance with the appropriate Class Environmental Assessments.

1.2 BACKGROUND

The Queen Elizabeth Way provides a major Provincial highway link through the Golden Horseshoe area at the west end of Lake Ontario, extending from Toronto to Fort Erie.

The highway was initially opened, in 1939, as an expressway but continual growth in traffic resulted in all the at-grade intersections, signalized intersections and traffic circles eventually being grade separated or closed so that the Queen Elizabeth Way is presently operating as a controlled access freeway. There are presently six lanes on the freeway from Toronto to Highway 403 in Burlington and four lanes from Burlington to Hamilton and beyond to Fort Erie.

The section of highway covered by this report is from Guelph Line in Burlington to Highway 20 in Hamilton.

Land use along this transportation corridor is urban in character with a mix of residential, industrial, institutional, commercial and open space uses.

The corridor crosses the Burlington Canal entrance to the Hamilton Harbour. The Canal is presently crossed by the Queen Elizabeth Way on a four lane bridge, the "Burlington Skyway", that was constructed in the late 1950's and opened to traffic in 1958. In addition, the Canal is crossed by a lift bridge that incorporates a two lane roadway and a single track CN railway spur. The lift bridge, which is under the jurisdiction of the federal Public Works Canada, was opened in 1962. As part of the Stage 1 redevelopment of the Queen Elizabeth Way, a four lane arterial road will be constructed across the Beach Strip and the deck of the lift bridge will be modified to accommodate this four lane roadway.

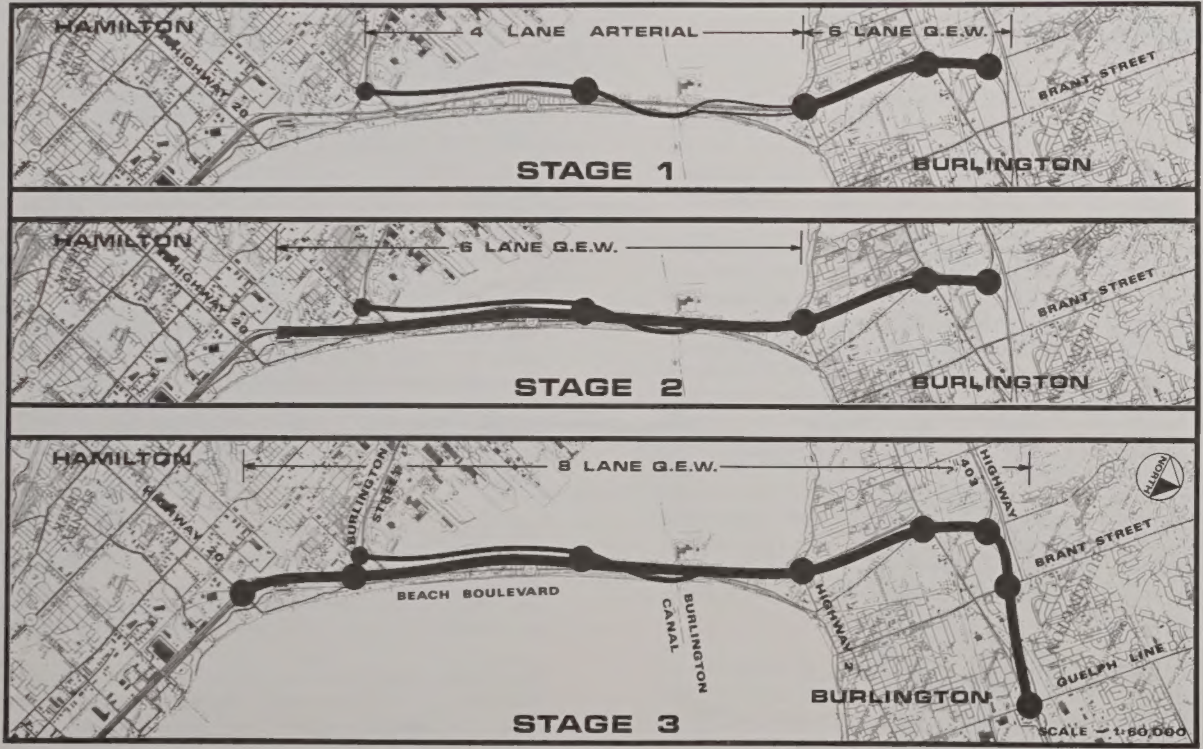


Figure 1

STAGED REDEVELOPMENT OF QUEEN ELIZABETH WAY

INTRODUCTION AND BACKGROUND

The Ministry of Transportation and Communications submitted an Environmental Assessment Report covering three stages of redevelopment of the Queen Elizabeth Way to the Ministry of Environment on December 11, 1979. These stages of redevelopment are, in summary, as follows:

Stage 1 - New arterial across Beach Strip and reconstruction of the Queen Elizabeth Way between Highway 2 and Highway 403 to six through lanes.

Stage 2 - "Twinning" of Burlington Skyway over the Burlington Canal and providing for six through lanes on the Queen Elizabeth Way.

Stage 3 - Addition of freeway lanes and interchange modifications in Burlington and Hamilton. This would represent the "ultimate" design in this section of the Queen Elizabeth Way.

The Government Review of the December, 1979 submission was issued on April 28th, 1981. This Review recommended approval of the construction of the Stage 1 improvements subject to a number of conditions. The Review further recommended that the decision on Stages 2 and 3 should only be taken after the Ministry of Transportation and Communications has submitted a further Environmental Assessment.

On the basis of the recommendations within the Review, the Ministry of Transportation and Communications, on July 6th, 1981, formally requested that the December, 1979 submission be amended by the removal of Stages 2 and 3 of the redevelopment.

The Minister of Environment subsequently issued a Notice of Acceptance of the Environmental Assessment dated July 23rd, 1981. This Notice of Acceptance which related solely to the proposed Stage 1 redevelopment of the Queen Elizabeth Way, also included a statement of the Minister's intention to approve the undertaking subject to a number of conditions and also subject to there being no requirement for a hearing.

No requirement for a hearing was filed prior to the final date of August 17th, 1981 and subsequently the Stage 1 redevelopment of the Queen Elizabeth Way was approved for construction, by Order-in-Council Number 2921/81 dated 15th October, 1981. See appendix A. This approval was subject to a number of conditions including a consultation procedure for the project and the need to file design and construction reports, with format and content as outlined for Chapter 5 of the Environmental Study Report guideline, as set out in the Ministry of Transportation and Communications' Class Environmental Assessments, at least 30 days prior to awarding construction contracts.

This present report documents the Stage 2 and Stage 3 redevelopment proposals for this section of the Queen Elizabeth Way.

1.3 PURPOSE OF THE UNDERTAKING

The purpose of the undertaking is to resolve both existing problems/deficiencies on this section of the Queen Elizabeth Way and those that will occur in the future if nothing is done to offset them. These problems stem mainly from the volume of traffic on the Queen Elizabeth Way between Burlington and Hamilton. The solutions of these problems must be carried out in such a way as to ensure that the solution provides the flexibility to accommodate future changes in traffic patterns.

In summary, a steadily growing volume of traffic has resulted in increased congestion which in turn has contributed to slow downs and stoppages, increased accidents, maintenance problems for the existing Skyway and has created an obstacle in the path of Regional and municipal development.

More specifically the volume of traffic on the Queen Elizabeth Way between Burlington and Hamilton has been growing steadily since the Burlington Skyway was opened in 1958 and at the present time the Skyway is handling approximately 50% more traffic than it was designed to accommodate. (A discussion on the factors affecting highway capacity is included in section 3.3.7). The growth of traffic on the Queen Elizabeth Way is discussed in detail in section 3.3.5, however, an appreciation of the rate of traffic growth, in this corridor, can be obtained from the fact that in 1960 the traffic on the Skyway was 17,000 A.A.D.T. (Annual Average Daily Traffic). This had grown to 34,600 A.A.D.T. by 1970 and to 56,900 A.A.D.T. by 1980 and is expected to continue to grow in the future. These volumes are comprised of commuter, tourist, recreational and commercial traffic including a high, year round truck component some of which is international in character.

Although the 1980 traffic volume on the Skyway was 56,900 A.A.D.T. there were significant variations during the year with average daily volumes of approximately 70,000 during August and 45,000 during January. These seasonal variations are shown graphically in figure 9.

As traffic volumes have increased there has been a corresponding increase in congestion that has resulted in problems/deficiencies in a number of areas:

Level of Service
Slow downs and stoppages have been increasing in recent years and commuter, long distance and truck traffic has been subject to time delays and increased fuel usage.

Accident Rates
The number and frequency of accidents has increased as traffic volumes have increased. At the present time the accident rate on the Skyway is approximately twice the Provincial average for freeways.

Maintenance of Existing Skyway
A further effect of the congestion within the corridor has been the inability to provide adequate maintenance on the Skyway.

Municipal Official Plans
The congestion within the Queen Elizabeth Way corridor has caused the Regional Municipalities of Niagara, Hamilton-Wentworth and Halton, as well as the Cities of Hamilton and Burlington and the Town of Stoney Creek to express concern that major improvements are required to the freeway within the corridor, in order to ensure the orderly development of their municipalities in accordance with their Official Plans.

The separate components of the problem are discussed below:

Level of Service (Slow Downs and Stoppages)

There is presently no electronic surveillance system to continuously monitor traffic flow on the Queen Elizabeth Way between Burlington and Hamilton. Consequently, the quantification of the observed problem of slow downs and stoppages can only be based on a theoretical calculation.

An empirical method of relating the volume of traffic to the geometrics of a roadway (number of lanes, etc.) and then predicting a "level of service" has been in use in Ontario for a number of years. This technique is based on the "Highway Capacity Manual-1965" which is discussed in detail in section 3.3.7. Calculations using this method indicate that the Skyway, which is the controlling feature in the corridor, can handle a maximum of 1,360 vehicles/per lane/per hour at "level of service E." (This is a condition at which 'stop and start' traffic flow is likely to occur on the freeway - Ministry policy considers a level of service D, which is a better level of service than E, to be the minimum tolerable for freeway operation).

On the basis of the daily and seasonal variations of traffic on the freeway it is possible to extrapolate from the hourly capacity of the freeway to a daily "theoretical breakdown capacity". The "theoretical breakdown capacity" on the Burlington Skyway is 40,000 A.A.D.T. which is the level beyond which congestion occurs. This state of congestion occurs only occasionally throughout the year. The freeway can handle more than this daily volume but the period of time during which it would operate on a stop-start basis will increase.

A computer modeling technique within the Ministry of Transportation and Communications permits the prediction of the number of hours within a year during which the Skyway will operate at level of service 'E' (stop and start conditions). The program used for this prediction is based on "Road User Benefit Calculation Package" which is referenced in the list of available material in appendix B.

The model output does not break the hours down into hours of the day, days of the week or weeks of the year and therefore, it is not possible to specify a split between the number of hours of stop and start operation that would be experienced by commuter traffic, long distance traffic and truck traffic. The total number of hours of congestion does however, give an understanding of the extent of the problem exclusive of slow downs and stoppages due to incidents (accidents, blown tires, maintenance, etc.).

- In 1972 the Skyway operated at level of service 'E' for approximately 25 hours in each direction (an average of 1 hour, in each direction, every two weeks). The 1972 figures have been quoted because the volume of traffic on the Skyway that year was approximately 40,000 AADT which is the "theoretical breakdown capacity" of the Skyway.

- In 1981 the Skyway operated at level of service 'E' for approximately 625 hours in each direction (an average of 1.7 hours a day every day of the year in each direction - in reality some days it operated at level of service 'E' for much longer periods and some days for very short periods if at all).

- In 2001 (assuming the completion of the Stage 1 redevelopment of the Queen Elizabeth Way but no other reconstruction) the Skyway would operate at level of service 'E' for approximately 2,900 hours in each direction (an average of 8 hours a day every day of the year in each direction).

The proposed improvement in the capacity of the Queen Elizabeth Way corridor will result in the reduction of slow-downs and stoppages with associated time loss and fuel usage. An assessment of the operating cost/benefits associated with the total Stage 2 improvement resulted in the identification of a long term discounted saving of $7.5 million in vehicle operating costs (including fuel) and a long term discounted saving of $81 million in time costs.

The reduction of slow downs and stoppages is part of the purpose of the proposed undertaking.

Accident Rates

The number and frequency of accidents on the Burlington Skyway has fluctuated from year to year. Over the three years 1978 to 1980 the number of accidents has decreased from previous years possibly due to mild winters. Even so, in 1980, approximately 400 accidents occurred on the Queen Elizabeth Way between Guelph Line and Highway 20 including over 125 accidents on the Skyway. Actual figures may be somewhat higher as only reported accidents are included within the Ministry of Transportation and Communications' files.

Section 4.2.4 includes a chart, figure 16, illustrating the growth in accident rates on the Skyway since 1964. It can be clearly observed that despite variations from year to year there is a correlation between accident rates on the Skyway and the volume of traffic on the Skyway. Based on these historic trends the 1980 accident rate would be approximately 1.9 accidents per million vehicle kilometres. In reality the accident rate on the Skyway in 1980 was approximately 1.25 accidents per million vehicle kilometres but as stated previously, the past three years have had an abnormally low accident rate. The average accident rate over the entire section of the Queen Elizabeth Way between Guelph Line and Highway 20 was also 1.25 accidents per million vehicle kilometres in 1980. The average accident rate for all freeways in Ontario, during 1980, was 0.8 accidents per million vehicle kilometres, a figure that has only varied slightly over the past several years.

Figure 11 in section 3.3.5 illustrates that the accidents on the Queen Elizabeth Way occur throughout the day and week and are not solely related to peak hour conditions.

For comparison with the Burlington Skway, the 1980 accident rate on the Garden City Skyway was closer to the Provincial freeway average with an accident rate of 1.0 accidents per million vehicle kilometres. This rate applies even though there is a poor pavement condition on the Garden City Skyway at this time. In this regard, the Ministry is currently undertaking remedial measures. The Garden City Skyway is, however, not subject to the same level of congestion as the Burlington Skyway. The Garden City Skyway has six lanes rather than four as on the Burlington Skyway and a 1980 traffic volume of 33,700 A.A.D.T. in comparison to 56,900 A.A.D.T. on the Burlington Skyway.

The restricted cross section of the existing Skyway structure also results in significant traffic disruption, if not complete closure for even the most minor of accidents. The narrow cross section also greatly impedes the arrival of emergency vehicles. This represents a critical deficiency.

The reduction of accidents on the Queen Elizabeth Skyway is part of the purpose of the proposed undertaking.

Maintenance of Existing Skyway

The volume of traffic on the existing Skyway restricts the level of maintenance that can be provided without causing severe interruptions to traffic movement. This is resulting in a deterioration of the structural condition of the Skyway to the point where it will be necessary to replace the existing bridge deck and railing in the near future.

Although the primary purpose of the proposed undertaking is not to facilitate the maintenance of the existing Skyway it will be necessary to close the existing Skyway, for approximately 6 months in order to carry out the required maintenance. If a second Canal crossing is available to handle the freeway traffic during this closure the impact on traffic movements will be limited. If a second Canal crossing is not available, the freeway traffic will have to be accommodated on other roadways including the arterial across the Beach Strip causing extensive congestion and noise on these roadways with the resultant loss of time and energy for the rerouting of an estimated 7,000,000 vehicle trips.

Municipal Official Plans

The Official Plans of the Regions of Niagara, Hamilton-Wentworth and Halton have been developed with land uses and supporting transportation systems that envisage the free movement of people and goods within the Queen Elizabeth Way corridor.

The three regional municipalities as well as the Cities of Burlington and Hamilton and the Town of Stoney Creek have indicated their endorsement of the need for improved capacity within the Queen Elizabeth Way corridor between Burlington and Hamilton. The specific comments of the municipalities are discussed in section 4.3.2. and contained in Appendix H.

The development of the Queen Elizabeth Way corridor in such a fashion that it will ensure the orderly development of the affected municipalities, in accordance with their respective Official Plans, is part of the purpose of the proposed undertaking.

In summary, the problems within the Queen Elizabeth Way corridor between Burlington and Hamilton are related to the fact that there is insufficient capacity within the corridor to handle the existing and future traffic volumes. These volumes are comprised of commuter, long distance and truck traffic. This traffic results in congestion both on week-days and week-ends, at the present time.

This capacity deficiency is manifested by slow downs and stoppages on the freeway causing time loss and wastage of fuel; unusually high accident rates; difficulties in providing adequate maintenance on the existing Skyway, and concerns on the part of the area municipalities that the existing freeway is constraining development.

In resolving the existing problems/deficiencies it must be recognized that there is a long lead time between initiating the planning of a facility and opening it to traffic. Consequently, a design must be proposed to handle the anticipated traffic at the time that the facility is opened as well as for a number of years beyond the date of opening so that reconstruction is not immediately required following the initial construction. In the case of the Burlington Canal crossing it is of note that a period of at least 8 years is required for detailed design and construction just because of the sheer magnitude of the project. This period of time is independent of any prior approvals process. In addition, it is also of note that incremental capacity improvements can not reasonably be added to a structure such as a new Skyway and consequently, it must be designed to provide the capacity that might be required within its anticipated life span (50-100 years).

1.4 GENERAL DESCRIPTION OF THE UNDERTAKING

The undertaking is an upgrading of the highway facility in the Queen Elizabeth Way corridor between Guelph Line in Burlington and Highway 20 in Hamilton. It is proposed that the Queen Elizabeth Way upgrading will ultimately take the form of a basic eight lane freeway with associated new or reconstructed interchanges and a new five lane bridge over the Burlington Canal to accommodate southbound traffic. The existing Skyway will be modified to accommodate northbound traffic. This upgrading is over and above the work described as Stage 1 in the Environmental Assessment report submitted to the Ministry of Environment on December 11th, 1979 and referenced in this report in section 1.2. It is referred to as Stages 2 and 3 of the overall upgrading of the Queen Elizabeth Way corridor between Burlington and Hamilton.

Stage 2 will provide for one additional basic lane in each direction, on the Queen Elizabeth Way, between Highway 2 in Burlington and Burlington Street in Hamilton. Together with the work that is to be carried out under Stage 1, this will provide for a basic six lane Queen Elizabeth Way between Highway 403 in Burlington and Highway 20 in Hamilton.

Stage 3 will provide for one further additional lane in each direction to provide for a basic eight-lane Queen Elizabeth Way between Guelph Line in Burlington and Highway 20 in Hamilton.

The specific construction that is proposed for Stage 2 and Stage 3 is as follows:

STAGE 2

1) Construction of a new five lane bridge over the Burlington Canal to accommodate southbound Queen Elizabeth Way traffic. This will initially operate as three through lanes plus a truck climbing lane. The fourth through lane will be reserved for future expansion.

2) Modification of the existing Skyway bridge to accommodate northbound Queen Elizabeth Way traffic as three through lanes plus a truck climbing lane.

3) Widening of the Queen Elizabeth Way to six lanes from the Skyway northerly to Highway 2 and from the Skyway southerly to Burlington Street.

4) Construction of a noise barrier on the east side of the Queen Elizabeth Way between the Skyway and Woodward Avenue.

It is of note that the Stage 2 redevelopment does not include any interchanges.

STAGE 3

1) Widening of the freeway from six to eight basic lanes between Guelph Line in Burlington and Highway 20 in Hamilton.

2) Reconstruction of the existing Guelph Line interchange.

3) Construction of a new interchange at Brant St.

4) Reconstruction of the existing Burlington Street interchange.

The reconstruction of the interchange with Highway 403 will take place as part of the construction of Highway 403 between Burlington and Mississsauga and consequently it has not been identified as part of the Queen Elizabeth Way undertaking for which approval is being sought. It is anticipated that the Highway 403 construction will occur between the timing of the Stage 2 and Stage 3 redevelopment of the Queen Elizabeth Way and, therefore, it has been identified on the Stage 3 plates that are included within Appendix I of this report.

The construction of an interchange between the Queen Elizabeth Way and a new North South Transportation Corridor in the vicinity of the Red Hill Creek, although physically possible, has not been identified as part of this proposal.

The widening of the freeway and the construction of the separate interchanges that are identified in Stage 3 will not necessarily occur as one redevelopment. Rather, any one of the interchanges or the widening could proceed independently if traffic conditions warranted the consideration of one component ahead of another.

Figure 1 schematically illustrates the three stages of redevelopment of the Queen Elizabeth Way. Although Stage 1 is not part of this Environmental Assessment, it has been included for reference purposes.

1.5 RATIONALE FOR THE UNDERTAKING

The purpose of the undertaking, as described in section 1.3, is to resolve a number of problems/deficiencies associated with the existing Queen Elizabeth Way between Burlington and Hamilton. These have been categorized in the following areas:

- Level of Service (Slow downs and stoppages)
- Accident rates
- Maintenance of existing Skyway
- Municipal Official Plans
- Future traffic requirements

In assessing these problems it is considered necessary to understand the significance of the Queen Elizabeth Way between Burlington and Hamilton in both the regional and Provincial context as well as in the local context.

The Queen Elizabeth Way is the only freeway link between Toronto and Niagara Falls/Fort Erie and it carries a combination of commuter, recreational and commercial traffic of a local, regional, Provincial, and international character. The Ministry of Transportation and Communications is presently proceeding with the construction of Highway 403 between Burlington and Toronto but the fact that the Queen Elizabeth Way is in the only major transportation corridor between Burlington and Niagara Falls emphasises its importance as the prime freeway facility between these two points.

The importance of the Queen Elizabeth Way as both the existing and future freeway facility between Burlington and Niagara Falls/Fort Erie has been affirmed by the Regional Municipalities of Niagara, Hamilton-Wentworth and Halton. Each of these municipalities contacted the Ministry of Environment during the summer of 1981 to stress the importance of improved capacity on the Queen Elizabeth Way, and in particular at the Burlington Canal crossing, to the orderly development of their municipalities in accordance with their respective Official Plans and to the continued well being of their Regional economies.

In order to determine the most appropriate means of resolving the problems within the Queen Elizabeth Way corridor, a number of alternatives were assessed to determine their effects on the identified problems as well as on the social and natural environment. The alternatives that were studied included "alternatives to the undertaking" and "alternative methods of carrying out the undertaking". A detailed discussion of these alternatives is included in sections 4.1 and 4.2 respectively.

The alternatives to the undertaking that were assessed were as follows:

- Do nothing
- Localized geometric improvements

- Traffic operation improvements
- Increase vehicle occupancy rates (including transit)
- Improvements to local road system
- Additions to Provincial Highway system
- Combination of alternatives
- Widen existing Queen Elizabeth Way (the undertaking)

The "do nothing" alternative would entail making no changes to the Queen Elizabeth Way corridor beyond those that are associated with the approved Stage 1 redevelopment.

The effects of the "do nothing" alternative on transportation would be a worsening of existing slow downs and stoppages with an estimated average of 4.9 hours per day of operation at level of service E by 1990 (congested service with potential for stop and start conditions). It would result in an increase in the existing high accident rates. It would result in further deterioration of the Skyway which even now requires closing for approximately 6 months to facilitate the replacement of the existing deck and railings. It would have required the provision of an additional capacity improvement by 1978 even if the Stage 1 improvement had been operable at that time (see figure 13).

The undesirable effects of the "do nothing" on the social and natural environment would be a constraint to the orderly development of the local municipalities in accordance with their Official Plans. It would result in noise level increases as traffic volumes increase. It would result in a continued deterioration of the existing constraints to mobility and accessibility for industry, trade and commerce in the study area. It would result in increased air pollution emissions as slow downs and stoppages occur in the future.

The advantages of the "do nothing" alternative are that it would result in no condition change to the social and natural environment in terms of land use, community, heritage resources, aesthetics, agriculture, water, vegetation, wildlife or environmentally sensitive areas.

There would be no capital construction costs associated with the "do nothing" alternative.

The major disadvantages associated with permitting the existing problems within the Queen Elizabeth Way to continue, and in fact worsen with time, were considered to be so significant in comparison to the advantages associated with this alternative that the "do nothing" alternative was not considered an acceptable alternative.

The possibility of providing "localized geometric improvements" by incorporating geometric design changes such as widening lane widths, widening shoulders and flattening grades was not reviewed in detail as an alternative because all of the geometric standards associated with the existing freeway are of a high enough standard that changes would make no difference to the capacity of the roadway. The one exception to this is the grade on the existing Skyway. The 3% grade over the 2,600 m long structure (1,300 m up and 1,300 m down) does result in a capacity restriction on the freeway. However, the flattening of this grade would require the complete removal and replacement of the existing Skyway and therefore, this was not considered to be a feasible "localized geometric improvement".

As there are no localized geometric improvements that can be made within this section of the Queen Elizabeth Way to increase the capacity, it was not considered necessary to discuss the advantages and disadvantages of doing so.

"Traffic operation improvements" are being incorporated within the Stage 1 redevelopment of the Queen Elizabeth Way. These include variable message signs, advance warning techniques and incident detection techniques. Additional techniques that could be considered as an "alternative to the undertaking" have been identified as ramp metering, truck restrictions and staggered working hours.

Ramp metering would provide some control on the surges of traffic onto the freeway and would therefore have some minor effect on slow downs and stoppages but would not improve the theoretical capacity of the corridor.

Truck restrictions would be contrary to the Ministry of Transportation and Communications' "Quantity and Quality Standards for King's Highway Service" which allow for free, movement of all vehicles on King's Highways at all times. In addition, truck restrictions would result in the transfer of the problem to the arterial across the Beach Strip and in particular to the lift bridge over the Canal.

Staggered working hours would provide some marginal improvement but many companies are in fact already operating under some form of altered work schedule.

In summary, the "traffic operation improvements" that would be available beyond the Stage 1 improvements would result in such an imperceptible reduction in the frequency of slow downs and stoppages that the condition changes brought about by this alternative would also be imperceptible.

The "increase vehicle occupancy rates" alternative considered the implementation of a number of techniques to reduce the number of vehicles within the corridor. These techniques included car and van pooling, transit and high occupancy vehicle lanes. As discussed in section 4.1.4 it is estimated that with the various techniques that are available, and recognizing the different types of traffic within the corridor, a maximum reduction of 6% in traffic volumes could be achieved if all of the possible high occupancy techniques were to be implemented and were found to be successful.

Even with a 6% reduction in traffic volumes, the transportation effects would be a worsening of slow downs and stoppages with an estimated average of 3.9 hours per day of operation at level of service E by 1990 (potential stop and start conditions). It would result in a continuation of the existing high accident rate. It would result in further deterioration of the Skyway which even now requires closing for approximately 6 months to facilitate the replacement of the existing deck and railings. It would have required the provision of an additional capacity improvement by 1980 even if the Stage 1 improvement had been operable at that time and even if the full 6% reduction in traffic volumes could have been achieved.

The undesirable effects of this alternative on the social and natural environment would be a constraint to the orderly development of the local municipalities in accordance with their Official Plans. It would result in noise level increases as traffic volumes increase. It would result in a continued deterioration of the existing constraints to mobility and accessibility for industry trade and commerce in the study area. It would result in increased air pollution emissions as slow downs and stoppages occur in the future.

The advantages of this alternative are that it would have no effect on the social and natural environment in terms of land use, community, heritage resources, aesthetics, agriculture, water, vegetation, wildlife or environmentally sensitive areas.

Capital construction costs were not estimated for this scheme as they could vary from virtually nothing for the implementation of pooling techniques up to tens of millions of dollars for an extensive transit system.

The major disadvantages associated with permitting the existing problems within the Queen Elizabeth Way corridor to continue, and in fact worsen with time, were considered to be so significant in comparison to the advantages associated with this alternative that the "increase vehicle occupancy rates" alternative was not identified as the preferred one.

The "improvements to local road system" alternative would entail the construction of three proposed roadways that are under the jurisdiction of the Region of Hamilton-Wentworth. These are the North-South Transportation Corridor, the East-West Transportation Corridor and the Industrial Perimeter Road as shown in figure 8. These roadways would divert approximately 18% of the traffic from the Queen Elizabeth Way corridor.

The transportation effects of an 18% reduction in traffic volumes would be to reduce, but not eliminate slow downs and stoppages to an estimated average of 2.1 hours per day of operation at level of service E by 1990 (potential stop and start conditions). It would result in a minor reduction in accident rates but would not reduce the rate to the Provincial freeway average. It would result in further deterioration of the Skyway which even now requires closing for approximately 6 months to facilitate the replacement of the existing deck and railings. It would result in some minor flexibility to handle future traffic volumes but would require an additional capacity improvement, over and above the Stage 1 improvement, by 1987 which is well before these alternative roadways could be operational.

The undesirable effects, of this alternative, on the social and natural environment would be the continuation of the constraint within the Queen Elizabeth Way corridor, to the orderly development of the local municipalities in accordance with their Official Plans. It would result in few other social and natural environmental changes within the Queen Elizabeth Way corridor but may have significant effects within the North-South, East-West and Industrial Perimeter Road corridors due to the construction of approximately 20 km of new roadway through predominantly urbanized areas. These effects have not been assessed as part of this study.

The capital construction costs associated with this alternative would be in the order of $170 million.

The limited reduction in slow downs, stoppages and accident rates that this alternative would provide were not considered sufficient to warrant the disadvantages associated with it and therefore, the "improvements to local road system" alternative was not identified as the preferred one.

The "additions to Provincial Highway system" alternative would entail the construction of a new Provincial highway. In particular, during the 1972/74 study of the Queen Elizabeth Way, there had been a discussion of the possibility of providing an additional freeway in the highway network in order to relieve the need to widen the Queen Elizabeth Way. This additional freeway would extend from Highway 403 east of Burlington to east of Hamilton.

A very brief assessment of this alternative indicated that it would need to be approximately 50 km long, require approximately 500 ha of land in a predominantly rural area, and either 2 or 4 crossings of the Niagara Escarpment (depending on the actual alignment). It would cost approximately $200 million to construct and would divert only 5%-10% of traffic from the Queen Elizabeth Way corridor.

At the time of the 1972/74 study it was assessed that the 5%-10% reduction in traffic volumes within the Queen Elizabeth Way corridor would neither eliminate the need to provide additional capacity in the Queen Elizabeth Way corridor nor warrant the significant costs and impacts associated with the construction of the new roadway and was therefore not considered to be a viable alternative.

During the preparation of this present Environmental Assessment report it was concluded that this assessment was still valid and therefore, no detailed documentation of advantages and disadvantages was carried out. The "additions to Provincial Highway System" was therefore not identified as the preferred alternative.

The "combination of alternatives" alternative would entail the consideration of a combination of all of the alternatives that have been discussed previously:

Do nothing
Localized geometric improvements
Traffic operation improvements
Increase vehicle occupancy rates
Improvements to local road system
Additions to Provincial Highway system

The "do nothing" alternative would result in a worsening of the existing conditions and by definition can not be considered in combination with the others.

There are no "localized geometric improvements" that can be made here to offset the identified problems.

The "traffic operation improvements" and "increase vehicle occupancy rates" alternatives can be considered in combination. The combined effects of these two alternatives would be virtually the same as the effects identified previously under "increase vehicle occupancy rates".

The "improvements to local road system" and "additions to Provincial Highway system" alternatives would be mutually exclusive from a Provincial viewpoint as both would provide a south-westerly bypass to the City of Hamilton. For this reason only one of these two alternatives has been considered in combination with the other alternatives. As discussed previously, the "additions to Provincial Highway system" alternative was not considered to be a viable alternative and therefore the "improvements to local road system" alternative was considered for an assessment of the combined effects of various alternatives.

The possible combination of alternatives therefore provides for an assessment of the following:

- Traffic operation improvements
  plus
- Increase vehicle occupancy rates
  plus
- Improvements to local road system

A combination of these alternatives could result in the removal or diversion of 20%-25% of the traffic from the Queen Elizabeth Way corridor.

The transportation effects of a 20%-25% reduction in traffic volumes would be to reduce (but not eliminate) slow downs and stoppages to an estimated average of 1.7 hours per day of operation at level of service E by 1990 (potential stop and start conditions). It would result in a minor reduction in accident rates but would not reduce the rate to the Provincial freeway average. It would result in further deterioration of the Skyway which even now requires closing for approximately 6 months to facilitate the replacement of the existing deck and railings. It would result in some minor flexibility to handle future traffic volumes but would require an additional capacity improvement (over and above the Stage 1 improvement) by 1990, which is well before all of the alternatives could be operational.

The undesirable effects of this alternative, on the social and natural environment would be the continuation of the constraint, within the Queen Elizabeth Way corridor, to the orderly development of the local municipalities in accordance with their Official Plans. It would result in few other social and natural environmental changes within the Queen Elizabeth Way corridor but may have significant effects within the North-South, East-West and Industrial Perimeter Road corridors due to the construction of approximately 20 km of new roadway through predominantly urbanized areas. These effects have not been assessed as part of this study.

The capital costs associated with the combined alternatives would be in excess of $170 million.

The limited reduction in slow downs, stoppages and accident rates that this alternative would provide were not considered sufficient to warrant the disadvantages associated with it and therefore the "combination of alternatives" was not identified as the preferred one.

The "widen existing Queen Elizabeth Way alternative" would entail the reconstruction of the Queen Elizabeth Way to provide three lanes in each direction plus a truck climbing lane at the Burlington Canal Crossing. In carrying out this reconstruction, provision would be made to add one additional lane, in each direction, at some time in the future. In addition provision would be made for the construction/reconstruction of interchanges within the corridor.

The addition lanes provided on the Queen Elizabeth Way during Stage 2 would provide for an increase of 50% in the capacity of the freeway on the approaches to the Canal Crossing and an increase of 100% in the existing capacity of the Skyway.

The transportation effects of these capacity increases would be to virtually eliminate slow downs and stoppages. It would result in a major reduction in accident rates from twice the Provincial freeway average to the Provincial freeway average. It would permit the replacement of the deck on the existing

Skyway as part of the reconstruction that will be required to make the existing Skyway operate as a one way structure and this could be carried out once the freeway traffic has been diverted to the new Canal Crossing. It would result in flexibility to handle future traffic volumes by not requiring a further capacity improvement until approximately the year 2000 at which time the one additional lane in each direction could be added to the freeway, i.e. Stage 3.

The social environmental effects of this alternative would be the elimination of a constraint to the orderly development of the local municipalities in accordance with their Official Plans. It would result in no change to land use. It would require the acquisition of 20 homes within the community. It would result in overall noise reductions within the corridor. It would require the removal of no unique heritage resources. It would result in changes to the aesthetics within the corridor. It would result in improved accessibility and mobility for industry trade and commerce. It would result in no changes to agriculture.

The natural environmental effects of this alternative would be minor changes to water resources in terms of filling the Hamilton Harbour and crossing the Red Hill Creek. It would result in improved air pollution levels due to reductions in slow downs and stoppages. It would result in the removal of 1.5 ha of vegetation. It would result in the removal of 0.3 ha of potential wildlife habitat within the Red Hill Creek Marsh/Van Wagoner's Marsh Environmentally Sensitive Area.

The capital construction cost associated with this alternative (i.e. Stage 2) would be $48.5 million.

The major advantages associated with the improved capacity within the Queen Elizabeth Way corridor were considered to be far more significant than the disadvantages associated with this alternative and therefore the "widen existing Queen Elizabeth Way" alternative was selected as the preferred one.

In summary the alternatives to the undertaking were all assessed in terms of their effects on transportation, the social environment and the natural environment. These effects have been summarized in the table in section 4.1.9.

The non-roadway alternatives to the widening of the Queen Elizabeth Way (do nothing, localized geometric improvements, traffic operation improvements and increase vehicle occupancy rates) had less effect on the overall natural and social environment (excluding the effects on Official Plans, noise and air) than the proposed undertaking. However, these alternatives provided only very minor improvements to the identified problems within the corridor and the residual problems that would remain with these alternatives were considered to be so severe that they outweighed the disadvantages associated with widening the Queen Elizabeth way.

The roadway alternatives to the widening of the Queen Elizabeth Way (improvements to local road system and additions to Provincial Highway system), or a combination of these with the non-roadway alternatives, would in part reduce the severity of the problem within the Queen Elizabeth Way corridor but would have greater overall social and natural environmental effects than the widening of the Queen Elizabeth Way. As the Queen Elizabeth Way widening would completely resolve the problems within the existing corridor, it was preferred to the other roadway alternatives.

On this basis the preferred alternative was identified as being the widening of the Queen Elizabeth Way.

Having identified the widening of the Queen Elizabeth Way as the preferred alternative, it was defined as the undertaking and a number of alternative methods of carrying out the undertaking were then analyzed. These included considerations in the following areas:

- Cross sections
- Alignments
- Grades
- Burlington Canal Crossing

INTRODUCTION AND BACKGROUND

Alternative cross sections that were considered related to the number of lanes to be provided on the freeway. At various times over the past 10 years the options of providing either a basic freeway cross section or a collector-distributor system have been reviewed. On the basis of the most recent traffic projections carried out by the Ministry of Transportation and Communications it was determined that both the Stage 1 redevelopment of the Queen Elizabeth Way (i.e. the construction of the arterial), plus one additional lane in each direction on the freeway are required at the present time. This increased capacity would handle the projected traffic volumes until close to the year 2000 at which time one further freeway lane would be required in each direction. On this basis it was determined that the existing cross section should be modified in a staged fashion. It would be initially widened from four to six lanes with the provision that the six lane construction could be easily widened to eight lanes at a future date when required.

Alternative alignments were only considered in two locations due to the restricted corridor. These were at the Burlington Canal crossing where it was necessary to shift the alignment in order to keep the existing Skyway in operation while construction of the new Canal crossing took place and secondly between Highway 2 and Fairview Street (part of the Stage 1 redevelopment) in order to increase the offset to an existing residential development. In all other locations, the existing centre line of the freeway was maintained.

Alternative grades were considered for the freeway within Burlington. These alternatives were to either approximately maintain the existing grade or to reverse the existing crossing roadways and place the freeway below grade. As the main area where there are existing noise impacts within Burlington were being protected by the shift in alignment between Highway 2 and Fairview Street, it was decided that the minor benefits that would be involved did not warrant the operational and high cost implications of lowering the grade.

At the Burlington Canal Crossing, the basic alternatives of providing a twin Skyway, a twin tunnel or a combination of Skyway and tunnel were reviewed. A detailed analysis was carried out for four basic bridge and tunnel combinations.

In weighing the advantages and disadvantages of the alternative methods of crossing the Burlington Canal it was noted that the preferrerd alternative for each of the factors that was considered was either the twin Skyway or the twin tunnel and that the combination of Skyway and tunnel alternatives did not provide the most desirable solution for any factor. On this basis the initial comparison was carried out between the twin Skyway and the twin tunnel alternatives.

The comparison of advantages and disadvantages for the twin Skyway and twin tunnel alternatives indicated the following:

- Capital Costs would favour the construction of the twin Skyway ($38 million for the bridge versus either $81.6 million or $98.7 million for the tunnel depending on whether an 8.2 m (27') draft or a 10.7 m (35') draft is provided within the Canal).

- Long Term User Benefits would favour the construction of the twin tunnel with a discounted net saving of $39.6 million for the tunnel and $33.6 million for the bridge. These costs reflect long term savings in accident costs, vehicle operating costs, truck time saving costs, car time saving costs, salvage costs and maintenance costs.

- Noise effects would result in a net decrease with either alternative with the greater benefit being associated with the twin tunnel. The twin tunnel would result in a 0-5 dBA increase for 8 homes, a 0-5 dBA decrease for 212 homes and a 5-10dBA decrease for 125 homes. The twin Skyway would result in a 0-5 dBA increase for 42 homes, a 0-5 dBA decrease for 210 homes and a 5-10dBA decrease for 29 homes.

- Residential Land Use effects would favour the construction of a twin tunnel because of the lower noise levels (see above), less salt spray, dirt and visual intrusion than with the bridge.

- Potential Recreational Land Use effects would favour the construction of a twin tunnel for similar reasons to those identified for "residential land use" because the recreational lands would be developed on the lands that are presently in residential use. The twin Skyway would however maintain the pedestrian accessibility (under the Skyway) to the Harbour shore line whereas the tunnel approaches would sever this access.

- Existing Institutional Land Use effects would favour the construction of a twin Skyway because it would have minimal impact on the Canada Centre for Inland Waters whereas the twin tunnel would be very close to the existing buildings and would require both the acquisition of property and the modification of the existing access.

- Land Availability would favour the construction of the twin Skyway because it would result in approximately 5 ha more land being available for other uses on the Beach Strip, than the tunnel.

- Property Required would favour the construction of the twin Skyway because it would entail the acquisition of 15 ha of land in comparison to 30 ha for the tunnel.

- View of Highway effects have not been identified as favouring either alternative.

- View from Highway effects have not been identified as favouring either alternative.

- Heritage Resources effects are identical for both alternatives and are minor in both cases.

- Capacity of the highway would be the same for both alternatives.

- Accident Rates would be similar for both alternatives.

- Frequency of Closures would marginally favour the construction of a twin tunnel because although the bridge alternative will still be subject to high winds, the additional lanes will result in the need for fewer closures than at present.

- Transportation of Hazardous Goods would favour the construction of a twin Skyway as no restrictions would be necessary with a bridge whereas they may become necessary with the construction of a tunnel. The severity of an accident involving such goods could be greater with the tunnel alternative.

- Ability to Replace Existing Skyway would not favour either the twin tunnel or the twin Skyway alternative as no replacement is required for the first and ample space to replace the existing Skyway is available for the second.

- Harbour Fill Area effects would favour the construction of the twin Skyway alternative as this would require 10 ha of fill area in comparison to 22 ha with the twin tunnel alternative. The Ministry of Environment has indicated that these losses of 0.5% or 1.1% of the area of the Harbour are "minor" although the Hamilton Region Conservation Authority has expressed the concern that any loss must be considered undesirable as individual effects become cumulative with other losses over time.

- Harbour Fill Volume effects favour the construction of the twin Skyway alternative as this would require 150,000 m^3 of fill volume in comparison to 450,000 m^3 with the twin tunnel alternative. As with the 'fill area', the Ministry of Environment has indicated that these losses of 0.05% or 0.17% of the volume of the Harbour are "minor" although the Hamilton Region Conservation Authority has expressed concern over cumulative effects.

- Water Quality effects favour the construction of a twin Skyway in comparison to a twin tunnel because of the loss of surface area for aeration purposes and loss of volume for retention time as discussed above.

- Vegetation effects are identical for both alternatives and are minor in both cases.

- Wildlife effects are identical for both alternatives and are minor in both cases.

The advantages favouring either the twin Skyway or the twin tunnel can be summarized as follows:

Twin Skyway Advantages

- Capital Costs
- Existing Institutional Land Use
- Land Availability
- Property Required
- Transportation of Hazardous Goods
- Harbour Fill Area
- Harbour Fill Volume
- Water Quality

Twin Tunnel Advantages

- Long Term User Benefits
- Noise
- Residential Land Use
- Potential Recreational Land Use
- Frequency of Closures

On the basis of the advantages and disadvantages of each alternative the Ministry of Transportation and Communications identified the twin Skyway alternative as being preferred in comparison to the twin tunnel alternative.

A comparison was then made of the twin Skyway with the combined Skyway and tunnel alternatives. In making this comparison it was noted that the existing Skyway has a residual life expectancy in the order of 50 years and therefore the combined Skyway and tunnel alternatives would operate until well into the next century. In making the comparison it was observed that the twin Skyway would have all of the advantages that were identified in its comparison with the twin tunnel except for the fact that the capital cost differential between the alternatives would be reduced ($38 million for the twin Skyway versus $58.5 million to $78 million for the combined Skyway and tunnel alternatives). However the advantages of the combined alternatives would be significantly reduced from those identified for the twin tunnel.

On this basis the Ministry of Transportation and Communications identified the twin Skyway alternative as the preferred method of crossing the Burlington Canal.

The proposed undertaking for which approval is being sought is illustrated on the plates in Appendix I. It will provide for the reconstruction of the Queen Elizabeth Way from four to six lanes with provision for an additional lane in each direction in the future. The existing alignment of the freeway will be maintained except at the Burlington Canal Crossing where it will be shifted to the west and between Highway 2 and Fairview Street (part of the Stage 1 improvements) where it will be shifted to the east to increase the offset to an existing residential development. The existing grade of the freeway will be retained approximately as it is today. At the Burlington Canal Crossing a second Skyway will be constructed to handle southbound traffic and the existing Skyway will be modified to handle northbound traffic.

The transportation effects of the proposed undertaking will be as follows:

- Elimination of slow downs and stoppages with long term discounted user benefits of approximately $90 million in terms of fuel and time savings.

- Reduction in accident rates from twice the Provincial freeway average on the Skyway and 1.6 times the Provincial freeway average on the remainder of the project, to the Provincial freeway average i.e. an initial reduction of approximately 160 accidents per year.

- Ability to provide required Skyway maintenance without closing the Canal Crossing.
- Ability to handle future traffic requirements with flexibility to accommodate growth to beyond the year 2001.

The social environmental effects of the proposed undertaking will be as follows:

- The existing Queen Elizabeth Way constraint to the development of the local municipalities in accordance with their Official Plans will be removed.
- There will be no change to land use.
- Twenty homes will be acquired from the community across the Beach Strip, in Stage 2.
- A combination of alignment modifications and noise barrier construction will result in overall noise level reductions within the corridor.
- No unique heritage resources will be removed.
- No archaeological resources will be affected.
- The aesthetics of the corridor will change due to a wider roadway, new structures, barriers and landscaping.
- The existing constraint to mobility and accessibility for industry, trade and commerce will be removed.
- There will be no agricultural effects.

The natural environmental effects of the proposed undertaking will be as follows:

- Minor changes to water resources due to 0.5 ha of fill within the Hamilton Harbour during Stage 2 and additional structures over the Red Hill Creek during Stage 3. (The majority of the fill that will be required in the Harbour will have been placed as part of the Stage 1 construction).
- Improved air pollution levels due to reductions in slow downs and stoppages.
- Removal of approximately 1.5 ha of vegetation, none of which has been identified as being of high quality.
- Result in the removal of 0.3 ha of potential wildlife habitat for birds and reptiles in the vicinity of the Red Hill Creek Marsh during Stage 3.
- Result in the filling of 0.3 ha of the Redhill Creek Marsh/Van Wagoner's Marsh Environmentally Sensitive Area during Stage 3. (This area is the same 0.3 ha of potential wildlife habitat that is discussed above).

The capital construction cost for Stage 2 will be $48.5 million.

On the basis of the traffic and economic benefits that will accrue as a result of the reconstruction of the Queen Elizabeth Way, the Ministry of Transportation and Communications believes that these more than outweigh the disbenefits associated with the construction. This viewpoint has also been expressed by the Councils of the Regional Municipalities of Niagara, Hamilton-Wentworth and Halton, by means of correspondence forwarded to the Ministry of Environment during the summer of 1981.

STUDY APPROACH

The study of the Queen Elizabeth Way between Burlington and Hamilton has been carried out in a number of stages. During 1972/74, the Ministry of Transportation and Communications carried out a Feasibility Study to identify the most appropriate means of providing improved capacity within the Queen Elizabeth Way corridor.

During 1978/79 the Ministry of Transportation and Communications carried out a study to identify means of staging and implementing the recommendations of the earlier study. At the same time an assessment was made to determine whether the 1972/74 study recommendations were still applicable or whether changes had occurred that would warrant reconsideration of the earlier recommendations.

The results of both studies were documented in an Environmental Assessment report that was filed with the Ministry of Environment in 1979. The 1979 submission resulted in the approval of the initial (Stage 1) redevelopment of the Queen Elizabeth Way but was not considered adequate for the subsequent (Stages 2 and 3) redevelopment.

This report documents the results of the 1972/74 study, the 1978/79 study as previously included within the 1979 Environmental Assessment, and in addition it provides supplementary data in those areas that were considered inadequate in the 1979 submission to the Ministry of Environment.

2.1 ENVIRONMENTAL ASSESSMENT PROCESS

The environmental assessment process entailed the acquisition of an extensive amount of data during the 1972/74 study.

A limited amount of additional base data was gathered in 1978/79 in those areas where the data was susceptible to change in the intervening period of time.

The base information was obtained from a variety of sources with the main emphasis being placed on the use of previously documented data. This data was supplemented by discussions with agencies, interest groups and area residents and also by field review where no readily identifiable documentation was available.

Specific sources of information are documented throughout the report and particularly in Chapter 3 - Existing Conditions.

The data was subsequently analyzed and the alternative considerations were evaluated in light of this analysis.

During the 1972/1974 study, the evaluation process entailed the comparison of the analyzed data in terms of nine study factors, specially:

Traffic Service
Flexibility
Costs
Property
Communities
Noise, Air and Water
Wildlife and Unique Areas
Aesthetics
Safety

During the 1978/79 study of alternative staging concepts, a modified list of factors were used but these reflected the same areas of concern.

During a supplementary analysis that was carried out in 1981 a further modification of the relevant factors was made in order to reflect the specific concerns that were raised during the review of the 1979 submission.

The specific analysis and evaluation of alternatives is documented in section 4 - Alternatives and Evaluation.

2.2 STUDY STAGES

The 1972/74 feasibility study was carried out in four stages, specifically:

Input Stage
Alternatives Stage
Evaluation Stage
Selection Stage

The following is a summary of the work that was carried out in each of these stages:

INPUT STAGE

- Assembling all available information for use in the study including land use data, soils information, utility data, traffic volumes and characteristics, accident statistics, noise levels, vegetation resources, wildlife resources, etc.
- Identifying study objectives.
- Summarizing the basic input in the form of displays.
- Meeting with each of the study teams to review data gathered to date.
- Summarizing team responses and assembling additional data.

ALTERNATIVES STAGE

- Developing alternative concepts based on variable modal splits and investigating alternative alignments, grades and methods of crossing the Burlington Canal.
- Validating and weighing of the study factors.
- Summarizing alternatives in the form of displays.
- Meeting with each of the study teams to review alternatives.
- Summarizing team responses and investigating other alternatives.

EVALUATION STAGE

- Analyzing the alternatives with respect to each of the study factors to determine the implications of the various alternatives on these factors.
- Comparing the alternatives with respect to each factor and finally with respect to all factors.
- Meeting with each of the study teams to either carry out or review the evaluation and to obtain response to the evaluation.

SELECTION STAGE

- Summarizing the various team evaluations.
- Selecting an alternative.
- Advising the study teams of the Ministry's decision and meeting with the municipal councils and the public to explain the selection.

Both technical and public groups were involved in each of the main study stages. For the purpose of the report, the technical and public groups have been identified in three categories, specifically, internal, external and public. The internal category includes all of the offices within the Ministry of Transportation and Communications who were involved in the study. The external category includes technical representatives of all other Ministries and agencies that had an involvement in the project; technical representatives of the affected municipalities and the Councils of the affected municipalities. The public category included both area residents and organized interest groups.

STUDY APPROACH

During the 1978/79 study the stages were less formal than those identified during the 1972/74 study, but the involvement of internal, external and public groups was once again incorporated.

During the preparation of the supplementary data in 1981 there were no formal study stages identified but a further round of meetings and discussions was held with internal, external and public groups.

The majority of agencies involved in the project participated during the 1972/74 study, the 1978/79 study and the 1981 study. In the following sections, only the names of the specific agency representatives that participated during either the 1978/79 or the 1981 studies have been noted.

2.3 INTERNAL PARTICIPATION

Participation in the study by technical representatives of the Ministry of Transportation and Communications was either at the level of the Project Team or the Internal Team.

2.3.1 Project Team

A working group known as the Project Team, which was comprised of representatives from the Ministry of Transportation and Communications and their Consultant, was responsible for the preparation of this document and the day to day activities associated with carrying out the studies. The Consultant retained to assist the Ministry of Transportation and Communications on this project was McCormick, Rankin & Associates Limited, a firm of consulting engineers specializing in transportation projects. The group was made up as follows:

Mr. P. Askie, P. Eng. Senior Project Manager	Planning & Design Section Central Region
Ms. J. O'Mara, M.A. Environmental Planner	Environmental Unit Central Region
Mr. C. Willis, P. Eng. Transportation Planner	Highway Program Development Branch
Mr. R. Nairn, P. Eng. Senior Project Manager	McCormick, Rankin & Associates Limited
Mr. J. Sutherns, P. Eng. Project Manager	McCormick, Rankin & Associates Limited

In addition, the following Ministry of Transportation and Communications personnel were involved during the course of the study as Project Team members:

Mr. B. Khojajian, P. Eng. Area Planning Engineer	Planning and Design Section Central Region
Mr. C. Meyers Area Planning Manager	Planning and Design Section Central Region
Mr. W. Kmet, P. Eng. Senior Project Manager	Planning and Design Section Central Region
Mr. C. Rayman, P. Eng. Senior Project Manager	Planning and Design Section Central Region
Ms. V. Hugel Environmental Planner	Environmental Unit Central Region
Ms. L. Schrama Environmental Planner	Environmental Unit Central Region
Mr. J. Freeman, P. Eng. Financial Analyst	Financial Analysis and Assessment Office

In addition, during the 1972/74 study, the Project Team included representatives of McCormick, Rankin & Associates Limited (Principal Consultant), Woods, Gordon & Company (Public Participation Subconsultant) and Ecoplans Ltd. (Environmental Subconsultant).

2.3.2 Internal Team

In addition to the Project Team, an Internal Team was formed. This Internal Team was comprised of representatives of the various specialist offices within the Ministry of Transportation and Communications and its members provided a broad basis of expertise on the various technical aspects of the study. This group was comprised as follows:

Mr. A. Casey Transit Planner	Transit Office
Mr. N. Close Sr. Landscape Planner	Landscape Planning & Operations Section, Maintenance Branch
Mr. M. Aimer, P. Eng. Sr. Structural Engineer	Structural Section, Central Region
Mr. R. Shannon, P. Eng. Reg. Traffic Engineer	Traffic Section Central Region
Mr. D. Gunter, P. Eng. Head, Geotechnical Section	Geotechnical Section Central Region
Mr. H. Aron Head, Property Section	Property Section Central Region
Mr. J. Marcolin, P. Eng. District Municipal Engineer	District #4 Hamilton
Mr. H. Bird Program Management Officer	Highway Program Development Branch

2.4 EXTERNAL PARTICIPATION

Participation in the study by representatives of municipalities, agencies and ministries external to the Ministry of Transportation and Communications has been categorized within the following groups: External Team, Municipal Technical and Municipal Councils.

2.4.1 External Team

The External Team met formally on two occasions during the 1978/79 study and once during each of the study stages during the 1972/74 study. The composition of the External Team during the 1978/79 study was as follows:

Mr. E. Mosley	Ontario Hydro
Mr. A. Bertolo	Canadian National Railways
Dr. T. Dick	Canada Centre for Inland Waters
Mr. R. Ducharme	Toronto Area Transit Operating Authority
Mr. M. Foley	Ministry of the Environment (West Central Region)
Mr. D. Pirie	Ministry of the Environment (Central Region)
Mr. E. Leesti	Public Works Canada (Ontario Region)
Mr. R. Hennessy	Hamilton Harbour Commission
Mr. M. Stephen	Halton Region Conservation Authority
Mr. J. Coates	Hamilton Region Conservation Authority

During the 1981 reassessment of the earlier submission to the Ministry of Environment, no formal External Team meetings were held. Rather, meetings were held both individually and collectively with the representatives of the various Ministries and agencies who were responsible for carrying out the Government Review of the 1979 Environmental Assessment.

These meetings resulted in discussions with the following:

Mr. V. Rudik	Ministry of Environment (Environmental Assessment Section)
Mr. D. Smith	Ministry of Environment (Environmental Assessment Section)
Mr. I. Veitch	Ministry of Environment (Special Studies Section)
Mr. H. Gidamy	Ministry of Environment (Noise Section)
Mr. B. Yang	Ministry of Energy
Ms. C. Lonero	Ministry of Treasury and Economics
Mr. N. Hester	Ministry of Natural Resources (Cambridge District)
Mr. R. Kennedy	Ministry of Housing
Mr. L. Strang	Ministry of Community and Social Services
Mr. D. Cuming	Ministry of Culture and Recreation
Mr. Z. Betanski	Ministry of Industry and Tourism
Mr. P. Burns	Ministry of Intergovernmental Affairs
Ms. S. Singh	Ministry of Agriculture and Food
Mr. B. Vanderbrug	Hamilton Region Conservation Authority
Mr. J. Hall	Halton Region Conservation Authority

Individual meetings were held with the "Government Reviewers" on a number of occasions. Joint meetings to discuss the project were held on 3 July, 1981 and 17 September, 1981.

The selection of the recommended alternative by the Ministry of Transportation and Communications reflects the involvement of these various parties in the study. This is not to say that the specific concerns and preferences of every participant have been met, as it would not be realistic to provide a single alternative that would satisfy the sometimes conflicting preferences of all participants.

The specific comments of the individual agencies are summarized in section 4.3.1.

2.4.2 Municipal Technical Involvement

During the 1972/74 study, technical representatives of the Cities of Burlington and Hamilton formed what was identified as a Municipal Technical Team which met at each of the four study stages.

During the 1978/79 study a more formal involvement of the affected municipalities was incorporated into the study by the formation of a Technical Advisory Committee.

This committee, which included representatives of both the Cities and the Regional Municipalities, was formed to provide guidance in the development of the plans for the initial stages of redevelopment of the Queen Elizabeth Way while at the same time maintaining an overview of the long range redevelopment proposals. The Technical Advisory Committee which met on 9 occasions during the 1978/79 study was comprised of representatives of the Ministry of Transportation and Communications and the following municipal representatives:

Mr. H. Schweinbenz Transportation Planning Engineer	Regional Municipality of Hamilton-Wentworth and City of Hamilton
Mr. J. Barr Senior Planner	Regional Municipality of Hamilton-Wentworth and City of Hamilton

Mr. R. Desjardins City Traffic Engineer	City of Hamilton
Mr. W. Phillips City Engineer	City of Hamilton
Mr. H. Wong Transportation Planning Engineer	Regional Municipality of Halton
Mr. K. Gonnsen Chief Design & Construction Engineer	City of Burlington

During the 1981 reassessment of the earlier submission to the Ministry of Environment, the Ministry of Transportation and Communications held a number of meetings with various representatives of the affected municipalities. The meetings included presentations of data to be included in the Environmental Assessment of Stages 2 and 3 of the Queen Elizabeth Way redevelopment. These presentations were made to senior staff representatives of the Region of Halton, the City of Burlington, the Region of Hamilton-Wentworth, the City of Hamilton and the Town of Stoney Creek.

The specific comments of the affected municipalities are included in Appendix H and are summarized in section 4.3.2.

2.4.3 Municipal Councils Involvement

The Councils of the City of Burlington, the City of Hamilton, the Regional Municipality of Hamilton-Wentworth and the Regional Municipality of Halton were involved during the 1972/74 and 1978/79 studies as well as during the 1981 reassessment of the earlier work.

During the 1978/79 study presentations to Council were made as follows:

- Combined meeting of City of Hamilton Council and Region of Hamilton-Wentworth Councils on February 20, 1979.
- Meeting of City of Burlington Council with invitations issued to Region of Halton Council on February 28, 1979.

At the meeting with Hamilton and Hamilton-Wentworth a number of requests were made which led to a further meeting of the affected municipalities with the Minister, the Honourable James W. Snow, on March 19, 1979.

During the 1981 reassessment of the earlier submission to the Ministry of Environment, the Ministry of Transportation and Communications made presentations to the affected Municipalities as follows:

- Region of Halton Public Works and Planning Committee on 23rd September, 1981.
- City of Burlington Public Works Committee on 21st September, 1981.
- Region of Hamilton-Wentworth Engineering Services Committee on 27th, September, 1981.
- City of Hamilton Transport and Environment Committee on 21st September, 1981.

The specific comments of the affected municipalities are included in Appendix H and are summarized in section 4.3.2.

2.5 PUBLIC PARTICIPATION

Public participation was incorporated as an integral component of both the 1972/74 study and the 1978/79 study. In addition the contents of the Environmental Assessment dealing with Stages 2 and 3 of the Queen Elizabeth Way redevelopment (this document) were reviewed with the public prior to its submission to the Ministry of Environment.

STUDY APPROACH

During the earlier study, steps were taken to identify any specific interest group that might wish to participate in the study and to organize the residential neighbourhoods within the study corridor that were not already represented by a ratepayers association or similar group.

Public Participation was then carried out by arranging a series of meetings at each of the four stages of the study.

Three types of meetings were held during the 1972/74 study:

Meetings with groups having a common interest such as individual neighbourhood groups and representatives of interested organizations were held on 12 occasions throughout the study. The normal attendance at these meetings was between approximately 5 and 30 people.

Formal public meetings at which presentations were made followed by a question and answer period, were held on 5 occasions throughout the study. Attendance at these meetings varied from a low of approximately 40 people to a high in excess of 300 people. These formal meetings were widely advertised by means of newspaper advertisements and by mailing approximately 4,500 brochures to residents in the area.

Public information centres that were also widely advertised and at which material was on display and Ministry of Transportation and Communications' representatives were available for discussion, but at which no formal presentation was made, were held on 7 occasions throughout the study. Attendance at these information centres varied between approximately 100 and 200 people.

The entire series of public meetings was encompassed in a two year period between February 1972 and April 1974.

During the 1978/79 study, it was recognized that there would be a need to involve the public a second time. In determining the format that the public participation program should follow, consideration was given to the following:

1) Very clear statements of public preferences had been made during the 1972/74 study.

2) The concepts being considered in 1978/79 were not significantly different from those reviewed with the public in the earlier study.

3) Municipal councils indicated to the Ministry that the public had "had enough meetings" and only wanted to see construction underway.

On this basis it was decided not to hold a series of meetings throughout the study but rather to arrange a series of information centres at the conclusion of the study. These public information centres were held as follows:

March 27th, 1979	Burlington Central Library
March 28th, 1979	Burlington Central Library
March 29th, 1979	Bell Cairn School, Hamilton

A total of approximately 400 people attended the information centres.

In addition to the public information centres, a separate meeting was held with representatives of all of the yachting clubs operating out of the Hamilton Harbour. This meeting was held on March 26th, 1979.

During the 1981 reassessment of the earlier submission, public information centres were held for the purpose of reviewing both the detailed plans for the approved Stage 1 redevelopment of the Queen Elizabeth Way and the contents of the Environmental Assessment for the Stage 2 and Stage 3 redevelopment of the Queen Elizabeth Way. These information centres were held as follows:

September 29th, 1981	Burlington Central Library
September 30th, 1981	Woodward Avenue Public School, Hamilton

A total of approximately 265 people attended the information centres.

A summary of public comments is included in section 4.3.3.

EXISTING CONDITIONS

3.1 NATURAL ENVIRONMENT

3.1.1 Physiography

The Queen Elizabeth Way from Guelph Line to Highway 20 traverses the physiographic region known as the Lake Iroquois Plain, which includes the Beach Strip across Hamilton Harbour.

The Lake Iroquois Plain is a relatively level plain that slopes gently to the north from Lake Ontario. The most distinct physiographic feature is the Burlington Beach. Created by lake-borne deposits of sand and gravel sometime after the last period of glaciation, the 15 m high sandstrip forms a natural bridge and breakwater across the Bay. As the sand bar developed, the east and west shores assumed different configurations. A sandy beach was formed on the east shore due to the wave action experienced from the lake. The protected west side, however, formed a shoreline of accumulated silt and humus.

Geological deposits overlying bedrock in the Burlington area are mainly of late Pleistocene origin. In preglacial times, the Old Dundas Valley was carved out of the Niagara Escarpment, and this valley underlies the present Hamilton Harbour. During the last glacial period, the old drainage pattern (including the Dundas Valley) was completely covered by till, which overlies the shale bedrock over most of the area. During the life of Glacial Lake Iroquois, clay and fine sand and gravel were deposited over the Halton Till.

The more recent deposit, which overlies the Iroquois Clay, is the extensive sand and gravel bar forming Burlington Beach. The major deposits of the most recent origin are either silts and sand of shallow thickness overlying till, or, in some cases, loose organic silt directly overlying Queenston Shale.

3.1.2 Soils

The description of the soils within the corridor was assembled by the Ministry of Transportation and Communications' soils section during the 1972-74 study. The corridor was split into five sections within which the soils were reasonably consistent. None of the identified soils are of a character that would warrant other than standard construction techniques to minimize erosion.

GUELPH LINE TO HIGHWAY 403

Over this section, the overburden is approximately 2 m in depth and consists of hard, reddish-brown silty clay over soft shale bedrock. The bedrock dips gradually in a south westerly direction. The upper 0.6 m of this shale is badly weathered.

HIGHWAY 403 TO HIGHWAY 2

This area extends along the toe of the old Lake Iroquois shoreline, which rises sharply towards the northwest, and terminates at the north end of the Beach Strip. The overburden consists of gravelly sand (beach deposit) overlying a grey-brown clay till varying in depth from approximately 6 m to 12 m and is underlain by shale bedrock of the Queenston Formation. This shale is reddish-brown in colour and decomposes rapidly when exposed. The prevailing ground water table is located just above the junction of the till and the overlying granular soils.

HIGHWAY 2 TO NORTH END OF SKYWAY

At Highway 2 and the Queen Elizabeth Way, there is approximately 5 m of overburden which consists of a grey-brown clay till, over the shale bedrock below. There is, however, an eroded vertical face in this shale bedrock which cuts diagonally across the Highway 2 Queen Elizabeth Way interchange immediately to the south of the existing Highway 2 structure and runs in a northwest-southeast direction. The existing overpass structure is founded on spread footings, but the culvert immediately to the west had to be founded on a piled foundation due to the very soft organic silt deposit overlying the shale, approximately 9 m below. This organic silt deposit extends across the Queen Elizabeth Way immediately south of the Highway 2 structure and terminates north of the Burlington Skyway. The deeper portion of this deposit is located on the Hamilton Harbour side of the Queen Elizabeth Way as evidenced by the settlement which has been occurring in the southwest quadrant of this interchange ever since its construction. No doubt, the depth of fill placed over this organic deposit has consolidated it over the period since the interchange was built, but it is still considered a very unstable area.

NORTH END OF SKYWAY TO WOODWARD AVENUE

Over the Beach Strip, sand and gravel was encountered at a depth of approximately 37 m during the original soils investigation for the Skyway structure. Additional filling with hydraulic fill (sand and gravel) was required to reclaim the area on which the Skyway structure was built as well as the area between the Skyway and Woodward Avenue. Bedrock is located approximately 40 m or more below the ground surface over this section.

A subsurface investigation carried out by Geocon Ltd., in September, 1973 failed to encounter bedrock in the borings put down north of the Burlington Canal. These borings were continued to a depth of approximately 50 m. However, near the south end of the site at a distance of approximately 550 m from the Canal, a bedrock surface was found at 40 m from the surface with a rising trend towards the south. The bedrock is a medium hard, horizontally laminated, reddish-brown Queenston shale.

WOODWARD AVENUE TO HIGHWAY 20

Between Woodward Avenue and the vicinity of the Lang's Food storage buildings, the Queen Elizabeth Way crosses a low, marshy area along the Red Hill Creek. Borings of this area indicate that the Queen Elizabeth Way rides the underlying organic deposit on approximately 4.5 m to 6 m of fill. Soundings outside the existing fill show that there is about 5 m of soft material in the marsh area.

The remaining portion of this section consists of 1.5 m to 3 m of silty sands overlying clay.

3.1.3 Water

There are four watercourses within the Study Corridor as shown on the plates in Appendix J. These are as follows:

- Rambo Creek
- Hager Creek
- Indian Creek
- Red Hill Creek

All four creeks handle predominantly urban run off and as such the prime concerns during the study have related to water quantity rather than quality. Because of the urban character of the creeks, no water sampling was carried out as part of the study, although one of the creeks (the Redhill Creek) does have a permanent Ministry of Environment water sampling station located on it.

In addition to the watercourses within the corridor there are two large adjacent water bodies, namely the Hamilton Harbour (Burlington Bay) including the Windermere Basin and Lake Ontario.

A description of each of the creeks, as well as the Harbour and Lake, is provided below.

Ground water within the study area has not been the subject of a separate investigation as the area is urban and adjacent homes are not on wells. In addition, the proposed roadway will not require any cut sections (i.e. locations where the roadway will be depressed).

EXISTING CONDITIONS

RAMBO CREEK

The Rambo Creek drainage basin is approximately bounded by Guelph Line on the east, Brant Street on the west and the Niagara Escarpment on the north. The Creek used to drain into Lake Ontario. During the mid 1970's, the Halton Region Conservation Authority constructed the Rambo-Hager Diversion Channel that diverted the Rambo Creek into the Indian Creek with an eventual outlet in Hamilton Harbour. The Diversion Channel crosses the existing Queen Elizabeth Way mid way between Highway 2 and Plains Road (Fairview Street).

At the Queen Elizabeth Way crossing, the Rambo Creek is primarily handling urban run-off. The Creek is, or will be, in the near future handled either by sewer or channelized sections over the majority of its length. There are presently proposals for the possible relocation of part of the Rambo Creek into the Hager Creek as discussed in the next section.

HAGER CREEK

The Hager Creek drainage basin is approximately bounded by Brant Street on the east (the west boundary of the Rambo Creek drainage basin), the Queen Elizabeth Way from the Freeman Interchange to Highway 2 on the west and the Niagara Escarpment on the north.

As with the Rambo Creek, the Hager Creek used to drain into Lake Ontario but was diverted, by means of the Rambo-Hager Diversion Channel, into the Indian Creek and Hamilton Harbour.

The Hager Creek also primarily handles urban run-off and is enclosed over much of its length.

During the preliminary design of the Queen Elizabeth Way, the City of Burlington requested the Ministry of Transportation and Communications to investigate a number of schemes for the relocation of the Rambo and Hager creeks between proposed Highway 403 and the existing Rambo-Hager Diversion Channel. The City initiated this request in order to determine whether a diversion would resolve an existing flooding problem located between the Queen Elizabeth Way and the Rambo-Hager Diversion Channel.

Based on this preliminary study it appeared feasible to construct a storm sewer along the proposed Highway 403 right-of-way to divert the entire upstream West Rambo Creek watershed into the East Hager Creek. The combined West Rambo and East Hager creeks would then follow the alignment of the existing East Hager Creek to its crossing of the Queen Elizabeth Way west of Brant Street. South of the Queen Elizabeth Way the combined creeks would parallel the freeway on the south and east to connect to the existing Hager Creek crossing of the Canadian National tracks.

At the conclusion of the investigation it appeared that the relocation was feasible but no formal agreements as to construction or cost sharing were made between the Ministry, the City of Burlington and the Halton Region Conservation Authority.

As of the time of preparing this report a study was being carried out to assess the details of implementation and cost sharing of this scheme. The study was being carried out by the Halton Region Conservation Authority, the City of Burlington and the Ministry of Natural Resources with participation on the study team by the Ministry of Transportation and Communications.

All of the work associated with the crossings of the Hager Creek and the diversion of the Rambo-Hager Creeks will be associated with either the Stage 1 redevelopment of the Queen Elizabeth Way or the construction of Highway 403. Reference to these works is, however, included in this Environmental Assessment report as the creeks fall within the study area.

INDIAN CREEK

Indian Creek does not cross the Queen Elizabeth Way although it parallels the freeway on the west side, from north of Highway 2 to its outlet into the

Hamilton Harbour. Over this section, the Indian Creek has been channelized to carry the discharge from the Rambo-Hager Diversion Channel. The proposed Stage 2 and Stage 3 redevelopment of the Queen Elizabeth Way will have no effect on the Indian Creek.

RED HILL CREEK

The Redhill Creek rises above the escarpment. A sanitary landfill site is located adjacent to the creek, above the escarpment, and leachate from this landfill is resulting in a very poor water quality in the creek.

Below the escarpment combined sewer overflows are located at Greenhill Ave., King St., Queenston Rd. and Barton St. During periods of high flow, these discharge untreated sewage directly to the creek. Below Barton St. the filter backwash and the sludge from the alum settling tanks of the water treatment plant and the effluent of the Woodward Avenue sewage treatment plant are discharged to the creek.

A Ministry of Environment permanent water sampling station is located on the Redhill Creek in the vicinity of Beach Boulevard. Data from this station is included in Appendix F.

The proposed Stage 3 redevelopment of the Queen Elizabeth Way will require the construction of bridges over the Redhill Creek.

WINDERMERE BASIN

Redhill Creek discharges into Windermere Basin which is at present filled up with organic sediment and grossly contaminated with heavy metals and PCB's. The Windermere Basin was investigated in detail during the design of the Stage 1 redevelopment of the Queen Elizabeth Way. The results of this investigation are on file within the Ministry of Transportation and Communications. The Stage 2 and Stage 3 redevelopment of the Queen Elizabeth Way will not require any construction that will effect the Windermere Basin.

HAMILTON HARBOUR (BURLINGTON BAY)

Hamilton Harbour is triangular in shape and has an area of 30 km^2 and a watershed of 500 km^2 with a volume of approximately 3×10^8 m^3 and an average depth of 6 m.

The Bay tends to function as an important waste-treatment facility by protecting Lake Ontario from elements which contribute to increasing the eutrophication and which, directly and indirectly, interfere with the operation of the municipal water treatment plants at Hamilton and Burlington.

The total water input to the Harbour at present is made up of approximately 60% run-off water and 40% "used water", the latter being the sum of the effluents from the sewage treatment plants. The Harbour water is characterized by high ammonia levels which come from the sewage treatment plants and from certain industrial processes.

LAKE ONTARIO

According to a study on "Circulation and Water Quality of Western Lake Ontario", (Department of Lands and Forest R.R. 62, 1965), the emissions from Hamilton Harbour (Burlington Bay) via the canal are the main source of pollution in Lake Ontario. These tend to be concentrated on or near the shore. East winds move polluted water towards the shore, and cold water upwelling, caused by westerly winds, tends to trap polluted water in a narrow band along the beach. The same study points out that when the Lake is calm and the currents are weak, the polluted water moves in discrete masses into the shallow water where they are not rapidly diluted. The evidence is that currents are strongly controlled by wind so that subsequent surges of water-borne effluent from the Harbour are not at all regular. However, during the summer, this motion is concentrated in surface layers due to thermal stratification.

The polluted water from the Harbour is emitted to the Lake through the Burlington Canal. The steady-state outflow is retarded in the spring by the annual rise in lake level and accelerated in the fall by the lowering of the lake level. In addition, the flow in the canal is frequently oscillating as the lake level rises and falls in the range of about 15 cm in relatively short period resonant waves (1 to 24 hours). This causes polluted Harbour water to be emitted to the lake in discrete "slugs" which are slowly or rapidly dispersed, depending on lake water movements.

3.1.4 Vegetation

A vegetation inventory was carried out during the 1972/74 Feasibility study. In particular a field survey was carried out by Ecoplans Limited during 1972. The survey indicated that, "Few, if any, areas might be described as being ecologically unique in the sense that they display natural qualities which have not been affected by man since 1800. These include logging, grazing, introduction of exotics and vandalism by children." The detailed results of the survey are documented in Appendix F.

The vegetation resources investigated in the 1972/74 study were those areas having some form of tree cover. No non-tree plant species were documented. As much of the area is residential, the vegetation has been planted primarily for reasons of aesthetics. There also appears to be considerable age variation in the residential planting. Other significant vegetation components are active and abandoned orchard lands, shelter belts, and farm homesite plantings. There are a wide diversity of species within the corridor with the most frequently observed being fruit trees, maple, basswood, walnut, ash, willow and poplar.

The vegetation resources in the study area were divided into four distinct categories namely, urban, aesthetic, agricultural, natural or semi-natural.

Due to the small and scattered nature of the forest cover in the study area, no attempt was made to quantitatively analyze the various stands. The approach used was primarily descriptive or qualitative in nature. A total of seventy-two stands were inspected on foot, numbered, and described with respect to species, age, and condition. It was found difficult to collectively describe many of the woodlands because they frequently were collections of scattered trees along fence lines, in old pastures, or along streets and highways. A description of the individual stands is included in Appendix F.

The overall 1972 inventory of tree stands was not repeated during the later studies. However, the Ministry of Transportation and Communications' Landscape Unit has carried out an assessment of the vegetation within the Queen Elizabeth Way right of way as part of the development of design drawings for the Stage 1 redevelopment. The assessment indicated that "the vegetation along the entire Beach Strip consists primarily of intolerant, fast growing pioneer hardwoods, principally poplar, willow and manitoba maple. These trees historically inhabit open spaces and over the years develop scattered colonies on old unused and unmaintained properties. Several of these trees are approaching maturity and will gradually decline over a period of time." The assessment did, however, identify some individual trees and groupings of trees that it would be aesthetically desirable to incorporate into the proposed construction. This detailed assessment may be reviewed within the offices of the Ministry of Transportation and Communications.

3.1.5 Wildlife

The study area is mainly urban in character and consequently there is only limited wildlife within the corridor. The predominant wildlife in the area is in the form of birds. A bird inventory was carried out during the 1972/74 study by Ecoplans Limited (see appendix F). This inventory was not repeated during the 1978/79 study.

Three clear spring and early summer mornings were selected for observations (June 19, 29 and July 5, 1972). Birds observed by telescope and binoculars in the marshes, on the water, or flying overhead were recorded at 9 locations from 1/2 hour before sunrise to 1 1/2 - 2 hours after sunrise. About 10 minutes was spent at each location. The 9 locations are illustrated in figure 2. The following table depicts the species found at each observation point. Locations 1 and 2 were dominated by fish-eating birds (gulls and terns) which feed over deep water. Birds seen at locations 3, 4, 5, 6 and 8 are

EXISTING CONDITIONS

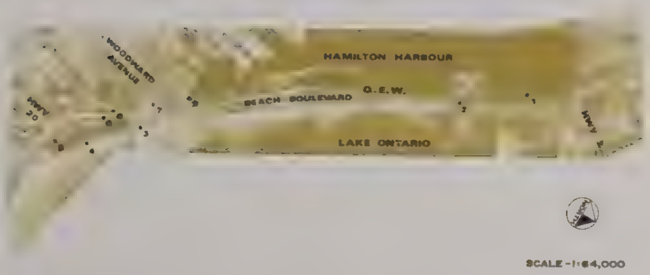


Figure 2

BIRD OBSERVATION LOCATIONS

typical of marshes or shallow aquatic ponds, while the birds at locations 7 and 9 are typical of terrestrial urban areas severely modified, that is, by landfill, lawns or heavily polluted water-land interfaces. Table 1 in Appendix F indicates the number of sightings of each species separated into the three days of observation.

BIRDS OBSERVED DURING 1972 SURVEY

Location	Species
W1	Herring and Bonapartes Gull
	Common Tern
	Red Wing Blackbird
	Starling
	Tree Swallow
W2	Herring Gull
	Starling
	Grackle
	Pigeon
W3	Red Wing Blackbird
	Green Heron
	Black Tern
	Grackle
	Starling
	Florida Gallinule
	Robin
	Mallard
	Pheasant
W4	Mallard
	Grackle
	Robin
	Starling
	Red Wing Blackbird
	Pheasant
	Black Tern
W5	Mallard
	Blue Winged Teal
	Red Wing Blackbird
	Grackle
	Starling
W6	Green Heron
	Red Wing Blackbird
	Pheasant
	Black Tern
	Starling
	Sandpiper
W7	Meadowlark
	Red Wing Blackbird
	Killdeer
	Grackle
W8	Mallard
	Blue Winged Teal
	Red Wing Blackbird
	Black Tern
	Green Heron
	Starling
W9	Starling
	Killdeer
	Red Wing Blackbird

No further wildlife inventory was carried out as part of the 1978/79 study although data was obtained on the identified Environmentally Sensitive Areas.

within the corridor. The Environmentally Sensitive Areas are discussed in section 3.1.6, however, the identified wildlife within these areas included the following:

The "Hydro Islands" provide a nesting site for common tern.

The "Tollgate Ponds" provide habitat for common tern, long billed marsh wren, green-winged teal, black crowned night heron, gadwall, common gallinule, american coot and herring gull.

The "Redhill Creek Marsh-Van Wagner's Marsh" was reported as including least bittern, pied-billed grebe, black tern and common gallinule. The area is also reported to include painted turtle, snapping turtle, musk turtle, eastern spiny softshell, map turtle and Blanding's turtle. It is also considered possible that this area provide an "important congregation site for red bats during migration."

3.1.6 Environmentally Sensitive Areas

The Official Plan for the Regional Municipality of Hamilton-Wentworth includes an identification of "Environmentally Sensitive Areas". The Hamilton Region Conservation Authority drew to the Ministry of Transportation and Communications' attention that three of these Environmentally Sensitive Areas are within close proximity to the Queen Elizabeth Way. These three areas are designated as the Hydro Islands (site 26), the Tollgate Ponds (site 27), and the Redhill Creek Marsh - Van Wagner's Marsh (site 28). The three areas are shown at a small scale in figure 3 and are also shown on the plates included in Appendix J. The following information with respect to the three areas was provided by the Hamilton Region Conservation Authority. No attempt has been made to assess the currency of this data because two of the sites will not be touched by the proposed Stage 2 or Stage 3 construction and the third site will only be affected by the Stage 3 construction. For this third site (Redhill Creek Marsh - Van Wagner's Marsh) a detailed inventory will be carried out closer to the time of construction in order to confirm the identified species.

HYDRO ISLANDS

This Environmentally Sensitive Area is identified as site 26 in the Hamilton Wentworth Official Plan. The Hydro Islands are located in the northeast corner of Burlington Bay and were constructed to provide foundations for 2 large hydro transmission towers.

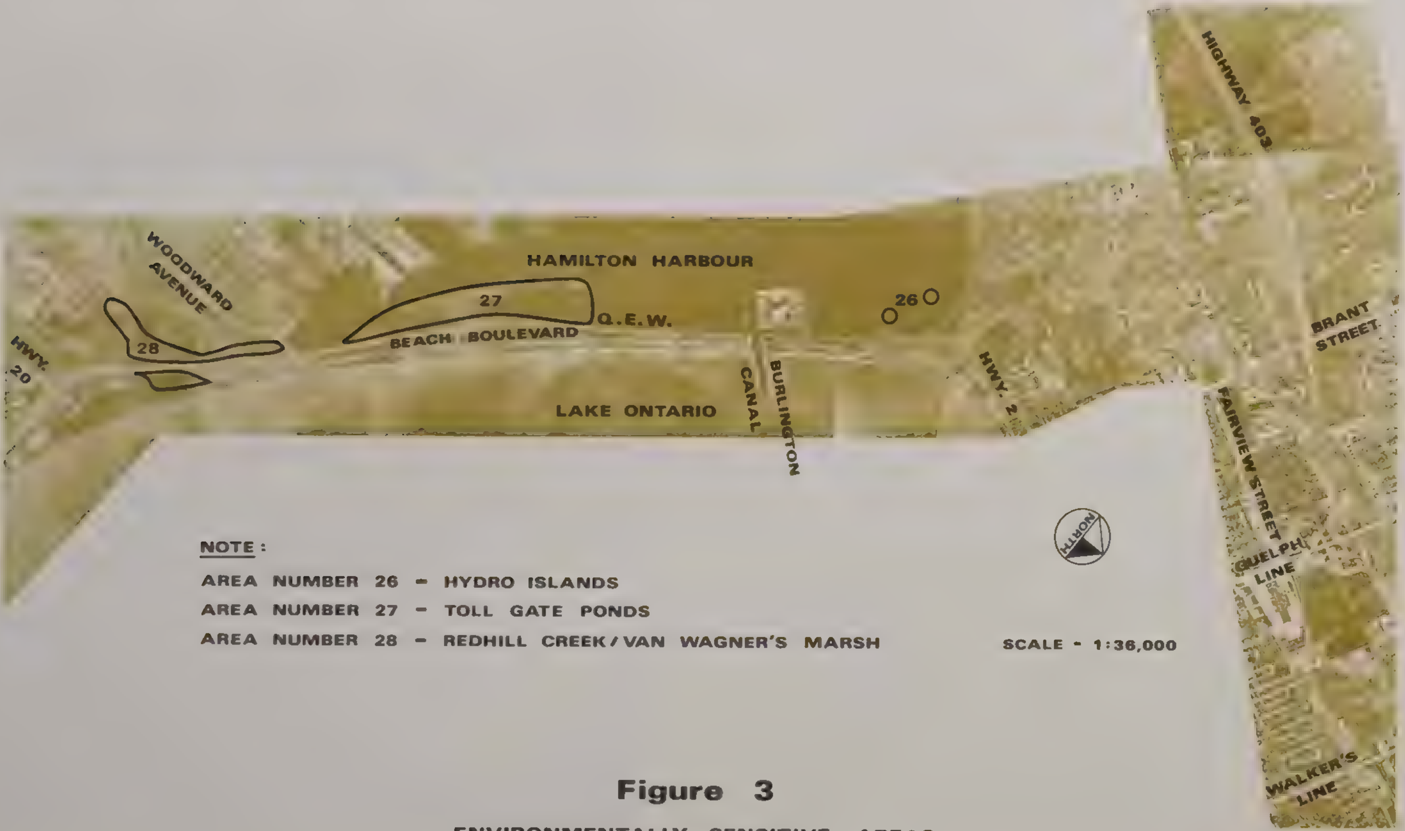
> "On these artificial, stone islands, at the base of the towers, dozens of common terns have nested."
>
> "The colonial nests are usually placed on the open edges of sandy and gravelly beaches or flat areas on islands. This ground nester (common tern) requires areas that are safe from mammalian predators such as raccoons and therefore the small Hydro Islands have been chosen for nesting. Only two nesting areas are in the Region."

The nearest Hydro Island is approximately 100 metres from the closest roadway. The proposed construction will not decrease this distance.

TOLLGATE PONDS

This Environmentally Sensitive Area is identified as site 27 in the Hamilton-Wentworth Official Plan. The Tollgate Ponds, as identified by Ecologistics in 1976 are contained within that area bermed off by the Hamilton Harbour Commission for the disposal of dredgeate material from the harbour.

The information provided by the Hamilton Region Conservation Authority states that although the area has been an active landfill site for some time, it does contain marsh and swamp land which serves as an area for nesting for common bird species. Birds nesting or frequenting this area are the common tern, long-billed marsh wren, green-winged teal, black-crowned night heron, gadwall, common gallinule , american coot, and herring gull. Some of these birds are considered rare within the Hamilton-Wentworth Region. For the common tern this is one of two nesting areas in the Region, the other being the Hydro Islands, for the long-billed marsh wren this is one of four regional



NOTE :

AREA NUMBER 26 - HYDRO ISLANDS
AREA NUMBER 27 - TOLL GATE PONDS
AREA NUMBER 28 - REDHILL CREEK / VAN WAGNER'S MARSH

SCALE - 1:36,000

Figure 3

ENVIRONMENTALLY SENSITIVE AREAS

nesting areas, for the green-winged teal this is one of two regional nesting areas, for the black-crowned night heron this is the only remaining regional breeding station, for the gadwall this is one of two regional nesting stations, for the common gallinule this is one of four regional nesting stations, for the american coot this is one of three regional nesting stations, and for the herring gull this is the only regional nesting station. Herring gulls are colonial in nature and very susceptible to human intrusion. Colonies, when protected, greatly increase in size and attract other rare species of gulls as well as terns as breeders, such as ring-billed gull, caspian tern, and common tern.

There has been some question as to whether these ponds still exist but as they will not be affected by the proposed Stages 2 and 3 redevelopment of the Queen Elizabeth Way this question has not been investigated as part of this study.

REDHILL CREEK MARSH - VAN WAGNER'S MARSH

This Environmentally Sensitive Area is identified as site 28 in the Hamilton-Wentworth Official Plan. The Redhill Creek Marsh-Van Wagner's Marsh covers approximately 30 ha and is located at the mouth of the Redhill Creek.

> "The mouth of Redhill Creek has a system of high quality marshes that are representative of a habitat that was once common in the harbour area. Urbanization now surrounds the area and has had its effects. Highways 20, Q.E.W., Burlington Street and Woodward Avenue and a CN railway line now pass through the area and have reduced the size of the marsh accordingly. The dominant vegetation is cat-tail . The water quality of the river near the mouth is poor because of the presence of pollutants from a variety of upstream sources. The marsh acts as a living filter or buffer for sediments and nutrients coming in from upstream sources. In this way, it helps to improve the water quality."

The data provided by the Conservation Authority indicates that bird species found within the marsh include least bittern , pied-billed grebe and the black tern . The least bittern is considered "rare due to habitat destruction associated with landfill projects and wetland drainage". The marsh is "the only remaining breeding station on the Hamilton shoreline (for the pied-billed grebe) and one of only two regional breeding areas". The black tern which nests on "rafts or mats of marsh vegetation floating in shallow water" is a species which is "declining within the Region due to habitat destruction". The marsh is one of two regionally known nesting stations. Other species found in the area include the common gallinule, "a colonial nester found in fresh water marshes of various sizes". Several hundred of these birds were counted breeding in the marshes of east Hamilton during the 1930s, however most of the marshes have since been destroyed by industrial and urban expansion and Van Wagner's Marsh is one of two remaining breeding stations.

> "It has been reported that the painted turtle, snapping turtle, musk turtle, eastern spiny softshell, map turtle and Blanding's turtle possibly still occur within these marshes. The eastern spiny, map and Blanding's turtles are regionally rare."

> "Possibly the beach is an important congregation site for red bats during migration. This migratory tree bat is more common southward than northward in the province."

> "This cat-tail marsh is a small remnant of a once common community in the Hamilton Harbour area. Cat-tail marshes develop in sheltered bays and inlets along the Great Lakes shoreline. In this Region the beach strip sand bar provides protection from the lake waves and allowed marshes to develop around Burlington Bay. With industrialization and urbanization developing behind an excellent harbour the marshes were filled in and destroyed. Today the Redhill Creek and Coots Paradise Marshes are the only big ones left."

The Redhill Creek Marsh-Van Wagoners Marsh will not be affected by the Stage 2 redevelopment of the Queen Elizabeth but will be affected by the widening of the freeway and the construction of the Burlington Street interchange in Stage 3.

3.2 SOCIO-ECONOMIC ENVIRONMENT

3.2.1 Municipalities

The Queen Elizabeth Way redevelopment is located at the west end of Lake Ontario. The project extends across the boundary of the two Regional Municipalities of Halton and Hamilton-Wentworth. Within the Region of Halton the project is entirely within the City of Burlington and within the Region of Hamilton-Wentworth the project is entirely within the City of Hamilton although the extreme southerly limit is at the boundary of the Town of Stoney Creek.

The Regional Municipality of Hamilton-Wentworth had a 1980 population of 410,000 within six area municipalities including the City of Hamilton. The Official Plan for the Regional Municipality of Hamilton-Wentworth, which is dated 19th June 1979, anticipated a population level of 550,000 by the year 2001. In the fall of 1981 the Region announced that this anticipated figure had been revised to 445,000.

The City of Hamilton, with a 1980 population of 306,640 is the third largest city in Ontario. It is the largest steel-producing centre in Canada and the associated manufacturing is extensive and varied. With an unusually large, completely protected harbour on Lake Ontario and the St. Lawrence Seaway, the City is also a lake and ocean port. Industry directly supports the majority of the population of Hamilton and indirectly supports most of the other occupations. In addition to the Steel Company of Canada Limited, the largest single employer, a large number of allied industries have grown up around the steel industry and these are engaged in the manufacturing of electrical equipment and appliances, chemicals, agricultural equipment, heavy machinery and textiles.

The Regional Municipality of Halton had a 1980 population of 247,000 within four area municipalities including the City of Burlington. The Regional Plan for the Regional Municipality of Halton, which is dated 6th, September, 1978, anticipated a population level of 398,000 by the year 2001.

The City of Burlington, which gained city status as of January 1, 1974 ranks as the thirteenth largest city in Ontario with a 1980 population of 112,722. Situated at the west end of Lake Ontario, it is principally served by the Queen Elizabeth Way and Highway 403 as well as C.N.R. rail lines. Up until the mid 1960's, urban development was basically confined to the corridor between the Queen Elizabeth Way/Highway 403 and Lake Ontario. Since that time, significant residential and light industrial/manufacturing development has occurred to the north of the Queen Elizabeth Way.

From surveys carried out by both municipalities as well as an origin-destination survey carried out by the Ministry of Transportation and Communications in 1973, it is apparent that there is significant interaction between the two cities, particularly in regards to work trips.

The Official Plans of both of the directly affected Regional municipalities assume the continued use of the Queen Elizabeth Way as a major transportation facility within their long range plans.

The Official Plan for the Regional Municipality of Hamilton-Wentworth includes the following policy:

9(24) "The Provincial Government shall be encouraged through the Ministry of Transportation and Communications to plan for additional highway capacity between Hamilton-Wentworth and points east via both the Q.E.W. Skyway Corridor and the Highway 403 corridor in order to maintain a level of accessibility into the Region that is consistent with the economic and development goals of the Region and to provide this additional capacity when demand warrants".

The Regional Plan for the Regional Municipality of Halton includes the following policy:

III D1-4d "Adopt, as the basis for planning the future road system the Functional Classifications Plan of Major Roads, shown on Map 2 and described in Figure 5. Major features of this Plan include the re-development of the Queen Elizabeth Way in the Skyway corridor to provide increased traffic capacity".

3.2.2 Land Use

Existing land uses abutting the Queen Elizabeth Way between Guelph Line and Highway 20 include residential, institutional, open space and industrial uses. These are illustrated in figure 4.

The major developments that effected a control on the reconstruction of the Queen Elizabeth Way included the following:

- Residential land uses abut the freeway on the west side between Plains Road and a point south of Highway 2 and on the east side across the Beach Strip. In addition, there are residential land uses in a number of locations that are close to, but not abutting the freeway.

- The Canada Centre for Inland Waters (C.C.I.W.) is situated on a land fill site west of the Burlington Skyway and north of the Burlington Canal. The C.C.I.W., which is operated by Environment Canada, is a water research and management centre that is unique in North America. The Centre consists of an Administration and Laboratory Building, a Research and Development Building, a Wastewater Technology Centre and a Hydraulics Laboratory.

Anticipated land use changes in the immediate vicinity of the freeway are as follows:

- Lands to the east of the Queen Elizabeth Way between Plains Road and Lockhart Road are proposed for redevelopment from agricultural usage to a combination of commercial and residential usage. The commercial usage is proposed to include a shopping plaza with approximately 55,000 m^2 of retail store area in the southeast quadrant of the Queen Elizabeth Way/Plains Road interchange. The residential usage is proposed to provide accommodation for in excess of 10,000 people. A start on construction of the shopping plaza was expected to be imminent at the time of preparing this report.

- The Halton-Wentworth Waterfront study recommended the removal of all existing housing from the Beach Strip and the redevelopment of the lands located to the east of the Queen Elizabeth Way as a major recreational facility. To this end the Hamilton Region Conservation Authority and the City of Hamilton have been acquiring properties on the Beach Strip since 1975. The program is budgeted annually, and as of the time of preparing this report, over 100 of a necessary 550 properties had been acquired. (This is in addition to the approximately 100 properties that were identified in the early 1970's as being required for the reconstruction of the Queen Elizabeth Way). This acquisition program is in conformity with the Regional Policies as set out in section 5.1 of the Official Plan of the Regional Municipality of Hamilton-Wentworth.

  The Halton Region Conservation Authority has similar responsibilities along the Beach Strip north of the Burlington Canal and has purchased, from Canadian National, all leasehold properties on the Lake Ontario side of the Canadian National spur line as well as a number of privately owned freehold properties fronting on to Lakeshore Road. This acquisition program is in conformity with the Regional Official Plan Amendment #1 for the Regional Municipality of Halton.

  Traffic forecasts given elsewhere in this report do not include the traffic that would be generated by this proposed recreational development.

- The Hamilton Harbour Commission's long range plans propose the development of port related industrial lands on the west of the Queen Elizabeth Way between the Burlington Canal and Woodward Avenue. The first stage of this development will occur on lands that have already been filled by the Commission. Initial development of these lands could occur early in the 1980's. These proposals are discussed further in section 3.3.11.

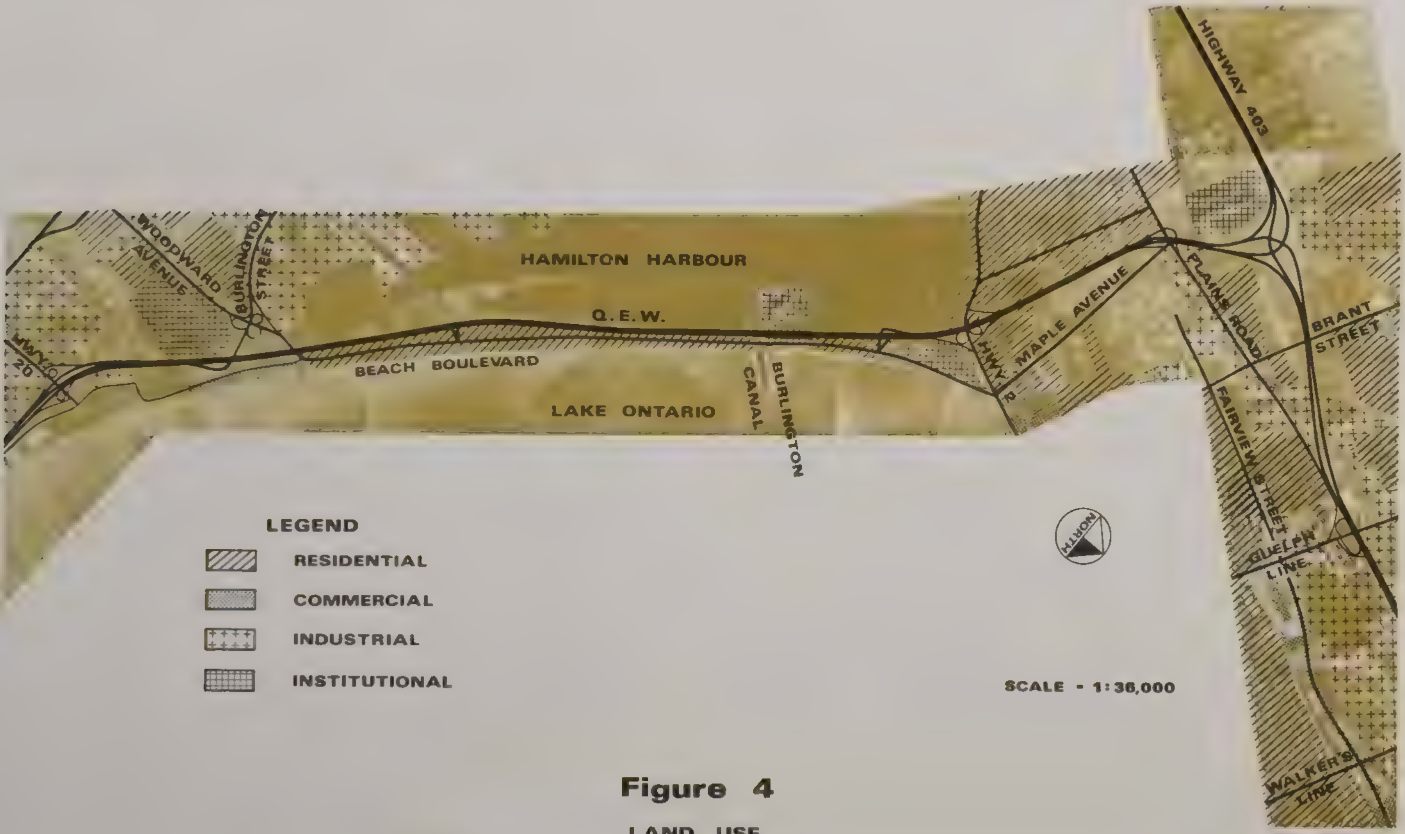


Figure 4

LAND USE

In addition to these anticipated major land use changes, there were a number of subdivision proposals, within close proximity to the Queen Elizabeth Way, that were active at the time of preparing this report. The status of these should be confirmed with the Ministry of Housing and with the Regional Municipality of Halton when detailed design proceeds. The appropriate Ministry of Housing file numbers are as follows:

24T-78009 - This proposal is for a mix of residential, commercial and industrial development with 3 single family, 4 commercial and 14 industrial units located to the north of the Queen Elizabeth Way between Guelph Line and Brant Street.

24T-77031 - This proposal is for a residential development with 7 single family and 60 semi-detached units located to the south east of the Queen Elizabeth Way between Brant Street and Fairview Street.

24T-76027 - This proposal is for a residential development with 38 single family and 28 semi-detached units located to the east of the Queen Elizabeth Way between Fairview Street and Highway 2. Noise from the Queen Elizabeth Way has been identified as a potential concern with the development of this site and noise control features will be imposed on it.

24T-78022 - This proposal is for a residential development with 38 single family units located to the east of the Queen Elizabeth Way between Fairview Street and Highway 2. Noise from the Queen Elizabeth Way has been identified as a potential concern with the development of this site and noise control features will be imposed on it.

24T-78023 - This proposal is for a residential development with 37 single family and 142 semi-detached units located to the east of the Queen Elizabeth Way between Fairview Street and Highway 2.

24T-79006 - This proposal is for a residential development with 14 single family and 4 semi-detached units located to the east of the Queen Elizabeth Way between Fairview Street and Highway 2.

These subdivision proposals are illustrated in figure 5 and on the plates in Appendix J.

3.2.3 Neighbourhoods

During the 1972/74 feasibility study, the Ministry of Transportation and Communications, in consultation with the municipalities, divided the study corridor into reasonably similar socio-economic neighbourhoods for ease of involvement in the public participation process. Seven neighbourhoods were delineated in Burlington and one in Hamilton. The boundaries of these neighbourhoods have been identified in figure 6 and on the plates in Appendix J.

These neighbourhoods have been observed to generally reflect similar characteristics at the time of preparing this report although no specific study has been carried out to confirm this.

Neighbourhood 1

This area is bounded by Plains Road on the north, Guelph Line on the east and the C.N.R. on the south. This is a relatively small neighbourhood that was established following World War II. Houses are generally small to medium sized and are well maintained. Residents of this area are predominantly blue collar workers. The area appears stable and exhibits a strong sense of community identity.

Neighbourhood 2

This area is bounded by Brant Street on the west, Upper Middle Road on the north, Guelph Line on the east and the Queen Elizabeth Way on the south. This area was developed during the 1960's. Houses are predominantly medium sized, single family. No strong community identity was apparent during the early Queen Elizabeth Way studies.

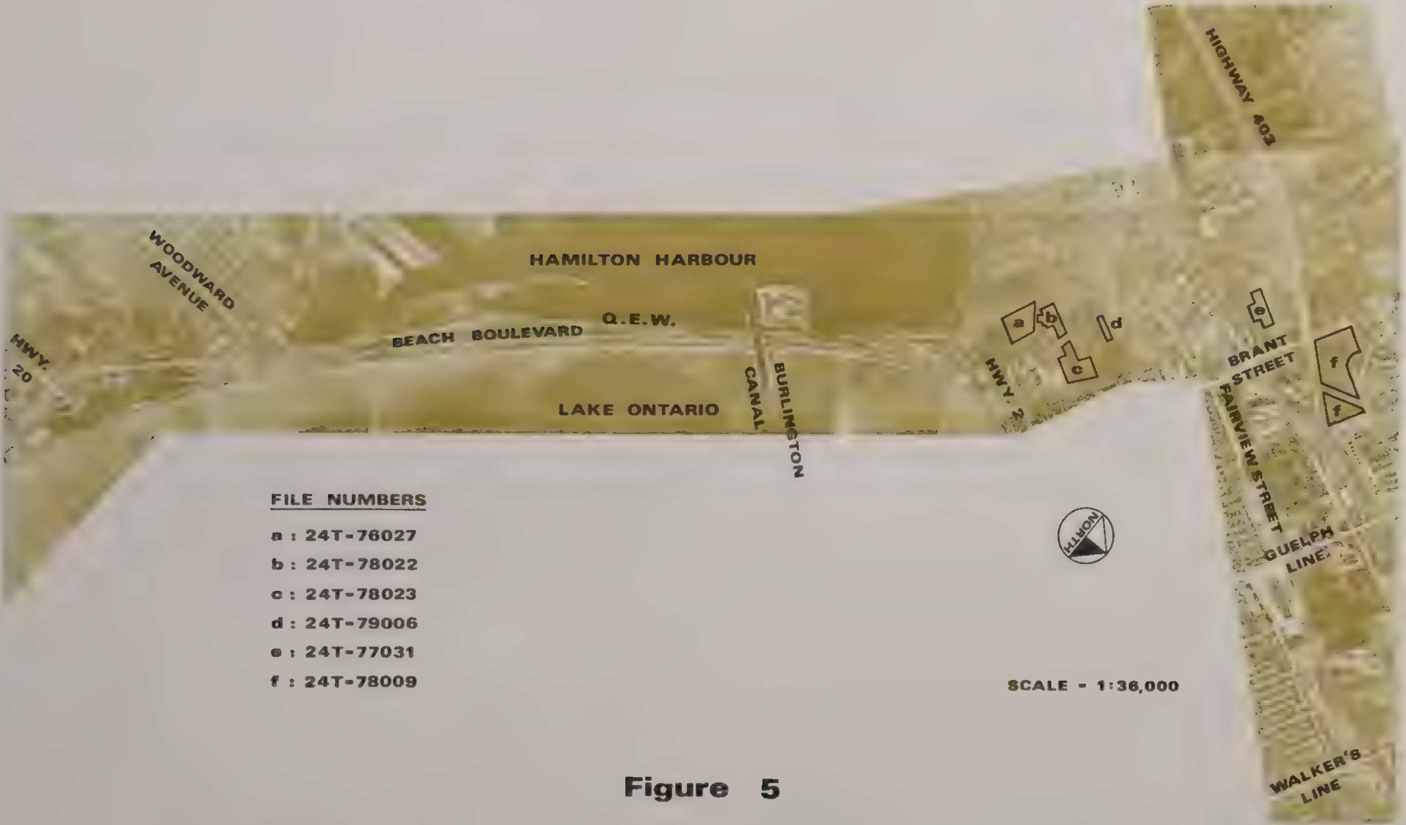


Figure 5

DRAFT PLANS OF SUBDIVISION

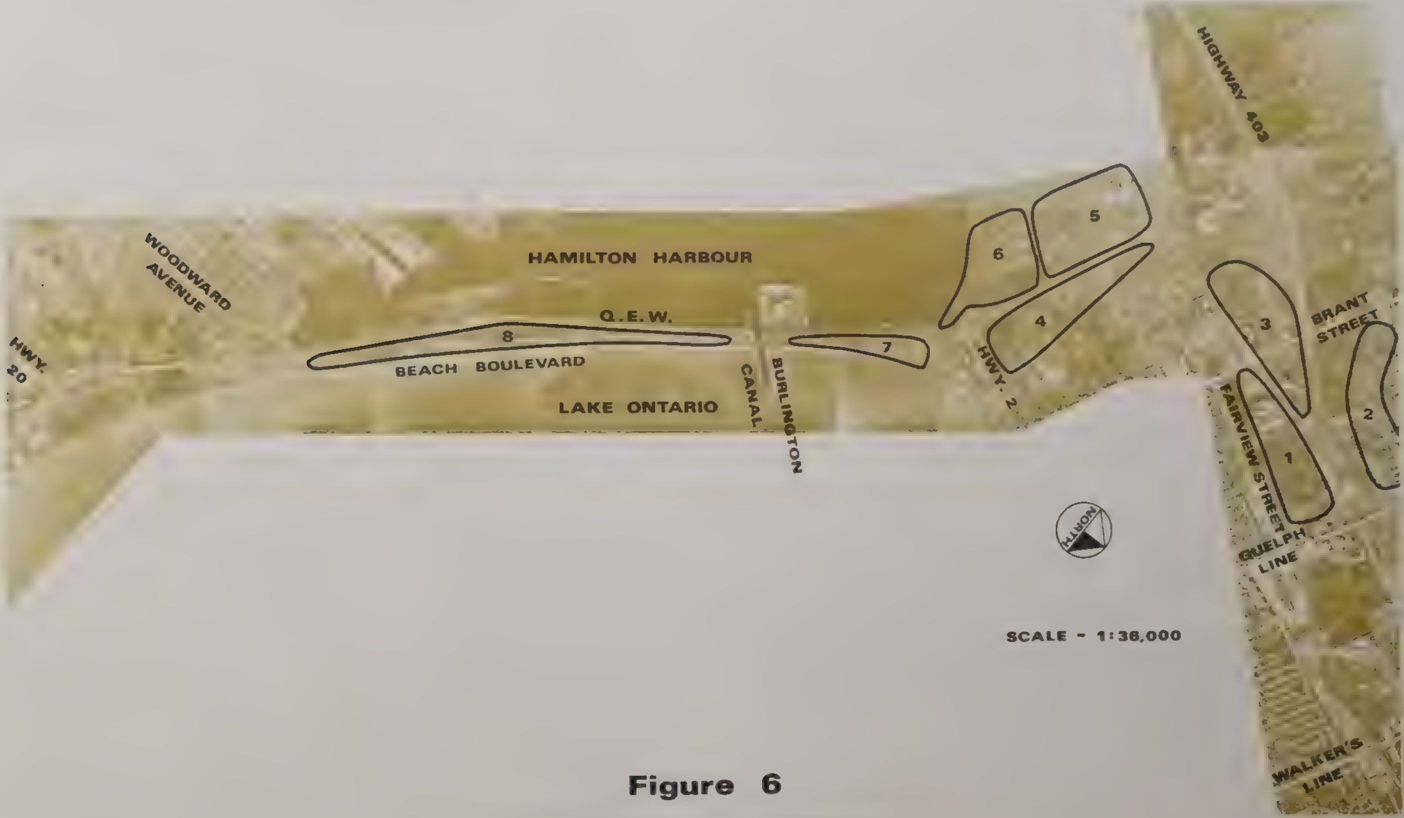


Figure 6

NEIGHBOURHOOD BOUNDARIES

Neighbourhood 3

This neighbourhood is triangular in shape, with Plains Road forming the base and the Queen Elizabeth Way forming the other two sides. Over the easterly section, the residential units are relatively small and were probably constructed in the late 1930's and early 1940's. Much of this area is occupied by a variety of ethnic groups. More recent residential development has occurred at the west end of this neighbourhood where single family as well as multiple family units have been built within the last few years. The residents of this neighbourhood are generally blue collar workers, employed by the steel industry in Hamilton.

Neighbourhood 4

This area is bounded on the west by the Queen Elizabeth Way, on the east by Maple Avenue and on the south by Highway 2. It is not a neighbourhood in the social sense but rather an agglomeration of land uses, many of which are in transition. From Lockhart Road north, the area is primarily used for market gardening with farm houses fronting on Maple Avenue. Most of this agricultural land has been assembled for development. South of Lockhart Road, there are several highrise apartments and this is where most of the residential population is located within the neighbourhood.

Neighbourhood 5

Directly abutting the Queen Elizabeth Way to the west, this neighbourhood is bounded by Plains Road to the north, Kings Road to the west and Greenwood Drive to the south. It is a relatively new subdivision with single family detached houses (bungalows, split levels, etc.). The sense of community identity or the desire to protect and enhance the residential environment and property values was probably the strongest of any of the identified neighbourhoods.

Neighbourhood 6

This neighbourhood is bounded by Greenwood Drive to the north, by Kings Road to the west, by the Hamilton Harbour to the south and by the Queen Elizabeth Way to the east. Residents of this neighbourhood were found to be extremely articulate and have a common desire to protect the residential environment in their neighbourhood.

Neighbourhood 7

Located on Burlington Beach between Lakeshore Boulevard and the Burlington Canal, this neighbourhood is characteristically a blue collar residential area. There is a very strong attachment to the beach area and a large proportion of the residents have lived on the beach for many years. They consider the area to be uniquely attractive despite the proximity of the Queen Elizabeth Way and the Burlington Skyway.

Neighbourhood 8

Located on the Hamilton side of the Beach Strip between the Burlington Canal and Woodward Avenue, this community comprised approximately 650 single family properties at the time of the 1972/74 study. Housing conditions at that time were rated as ranging from poor to fair and reflected the uncertain future of the area. More than two-thirds of all buildings were owner occupied, while tenant occupied buildings accounted for one-tenth of all assessed properties. At the time of the 1972/74 study there was a strong sense of community identity as many of the residents had lived on the beach for a long time and had lived together through such adversities as traffic congestion (prior to construction of the Skyway), industrial pollution, lack of municipal services and high water conditions. Most residents were blue collar workers.

Since the mid 1970's the City of Hamilton and the Hamilton Region Conservation Authority have been actively purchasing properties within this neighbourhood for the purposes of developing the area recreationally. As of the time of preparing this report approximately 100 homes had been purchased and demolished. The acquisition program is in conformity with the municipality's "waterfront plans". In addition the Ministry of Transportation and Communications has purchased and removed 104 homes in this area since 1970.

3.2.4 Noise

A series of noise level measurements were taken during 1972/73. Thirteen different locations were selected along the Queen Elizabeth Way from Guelph Line to Highway 20. At each location noise levels were measured at the existing right-of-way limit and at various distances back from the freeway. No existing noise levels were measured in the Burlington St./Queen Elizabeth Way interchange area since existing land use was predominantly light industrial. The noise levels were recorded as L_{10} dBA, i.e. the noise level, in decibels weighted on the A scale, that would be exceeded 10% of the time during the period of measurement. Noise levels at the right-of-way ranged from a high of 82 dBA approximately 600 m south of the Plains Road/Queen Elizabeth Way interchange to a low of 60 dBA at the Highway 2/Queen Elizabeth Way interchange. Recordings across the Beach Strip varied between 68 dBA and 75 dBA at the existing property limit. Noise levels at some locations over this section had a tendency to increase as the measuring location was moved easterly from the freeway property line. This apparent paradox is accounted for by two circumstances. (1) In the vicinity of the Skyway, the bridge itself acts as a noise barrier, the benefit of which diminishes as the distance from the freeway is increased. (2) As the distance from the freeway increases, the distance to Beach Boulevard decreases and the effect of traffic noise from this roadway becomes more significant in the actual measurement.

An additional series of noise level measurements were taken in December 1978 to determine whether there had been significant changes in the intervening 5/6 years. No major differences were recorded.

During the 1981 reassessment of the earlier submission to the Ministry of Environment, the Ministry of Transportation and Communications carried out a complete reappraisal of both the existing and anticipated future noise levels within the Queen Elizabeth Way corridor. This reappraisal included a computer simulation of the existing (1980) and year 2001 noise conditions at over 250 locations affected by noise from the Queen Elizabeth Way. The computer program that was used was based on the National Co-operative Highway Research Project 3-7/3 "Design Guide for Noise Prediction and Control".

Noise level contours were prepared from the individual noise level calculations. These contours reflected existing conditions, future conditions both with and without noise barriers and noise level changes. The contours were developed in 5dBA increments for locations at or above Leq=60dBA. The individual noise level calculations and the contours have been documented in a separate report that is available for review within the offices of the Ministry of Transportation and Communications. The results of the analysis have been summarized for inclusion in this Environmental Assessment.

The assumptions on which the noise analysis was based are as follows:

- Existing conditions reflect the roadway network and associated traffic volumes as they were in 1980.
- Future conditions reflect the roadway network corresponding to the Stage 3 redevelopment of the Queen Elizabeth Way redevelopment and traffic volumes as projected for the year 2001 and documented in section 3.3.6 of this report.
- All sound levels were calculated as "A", weighted 24 hour equivalent sound levels. (Leq)

To interpret the noise levels quoted within the report it is of note that:

- A noise level change of less than 5dBA can be considered as minor.
- A noise level change of 5-10dBA can be considered as significant.

EXISTING CONDITIONS

- A noise level change of more than 10dBA can be considered as major.
- The Ministry of Housing has produced a document entitled "Guidelines on Noise and New Residential Development Adjacent to Freeways - April 1979" that states that:
  - "The objective for predicted sound levels in outdoor recreational areas is 55dBA or less".
  - "The Ministry of Transportation and Communications shall plan to achieve an attenuated sound level as low as technically, administratively and economically practicable below 70dBA where a freeway is proposed to be built or expanded through a developed residential area".

The analysis of the highway was carried out on the basis of five different sections of the roadway that had similar characteristics, these were:

- Highway 20 to Burlington St.
- Burlington St. to south end of Skyway
- Burlington Skyway
- North end of Skyway to Fairview St.
- Fairview St. to Guelph Line

Highway 20 to Burlington St.

This area is predominantly open space, industrial or institutional in character with a small localized cluster of homes on the east side. At the present time, there are 13 homes experiencing noise levels in excess of Leq=60dBA. The noise levels at these homes will not change in the future because increases in noise levels due to traffic volume increases will be offset by shielding afforded by construction of the proposed Burlington Street interchange. The existing and future noise levels and anticipated noise level changes for this section are summarized below:

HIGHWAY 20 TO BURLINGTON STREET

Noise level in dBA (Leq 24)	Number of Houses subject to noise levels	
	Existing (1980)	Future (2001)
75+	0	0
70-75	0	0
65-70	12	12
60-65	1	1

HIGHWAY 20 TO BURLINGTON STREET

	Noise level change in dBA	Number of houses subject to noise level change (1980 - 2001)
Increase	10+	0
	(5-10)	0
	(0-5)	0
Decrease	(0-5)	0
	(5-10)	0
	10+	0

Burlington Street to south end of Skyway

This area is predominantly single family residential on the east side of the highway and open space on the west side. At the present time there are 261 homes experiencing noise levels in excess of Leq=60 dBA.

Noise levels in this location will change in the future due to (1) increases resulting from higher traffic volumes on the freeway (2) decreases resulting from the diversion of traffic, following the Stage 1 construction, from Beach

Boulevard to the proposed arterial roadway and (3) decreases resulting from the construction of a noise barrier during Stage 2.

The future noise levels and anticipated noise level changes for this section have been calculated both with and without an allowance for the mitigation afforded by a barrier with a 3 m effective height so that the benefit of the barrier can be appreciated.

From the summary table below, it can be observed that the proposed construction, including a noise barrier, will result in overall noise level reductions in this area.

BURLINGTON STREET TO SKYWAY

Noise level in dBA (Leq 24)	Number of houses subject to noise levels		
	Existing (1980)	Future (2001)	
		Without noise barrier	With noise barrier (proposed)
75+	0	0	0
70-75	10	8	0
65-70	65	51	6
60-65	122	110	121

BURLINGTON STREET TO SKYWAY

Noise level change in dBA	Number of houses subject to noise level change (1980-2001)	
	Without noise barrier	With noise barrier (proposed)
10+	0	0
(5-10)	0	0
(0-5)	63	0
(0-5)	28	218
(5-10)	0	10
10+	0	0

Burlington Skyway

This area is predominantly single family residential on the east side of the highway with some institutional uses at the north limit of the Skyway. The area to the west of the highway is either open space or institutional. At the present time there are 406 homes experiencing noise levels in excess of Leq=60dBA, these are all to the east of the highway.

Noise levels in this location will change in the future due to (1) increases resulting from higher traffic volumes on the freeway, (2) increases over the central section of the Skyway resulting from higher traffic volumes being diverted to Beach Boulevard following the Stage 1 construction, (3) decreases at each end of the Skyway resulting from the diversion of traffic, following the Stage 1 construction, from Beach Boulevard to the proposed arterial roadway and (4) decreases resulting from a shift in the centre line of the freeway to the west.

The future noise levels and anticipated noise levels changes for this section have been calculated for the proposed twin Skyway construction as well as for the alternative of constructing a single tunnel along with the existing Skyway and the alternative of replacing the existing Skyway with a twin tunnel.

As part of the review of the Queen Elizabeth Way project the Ministry of Transportation and Communications was asked to consider the construction of a noise barrier along the existing Skyway. The Ministry's Structural Section has indicated that the additional wind loadings associated with such a barrier would result in the need for extensive modifications to the foundations under the existing Skyway and that therefore, this could not be considered as an economically feasible proposal.

From the summary tables below it can be observed that the proposed twin Skyway will result both in some noise level increases and some noise level decreases.

EXISTING CONDITIONS

BURLINGTON SKYWAY

Noise level in dBA (Leq 24)	Numberof houses subject to noise levels			
	Existing (1980)	Future (2001)		
		Twin Skyway (proposed)	Skyway and Tunnel	Twin Tunnel
75+	0	0	0	0
70-75	7	10	9	0
65-70	86	46	21	28
60-65	190	152	123	96

BURLINGTON SKYWAY

Noise level change in dBA	Number of houses subject to noise level change (1980-2001)		
	Twin Skyway (proposed)	Skyway & Tunnel	Twin Tunnel
10+	0	0	0
(5-10)	0	0	0
(0-5)	42	19	8
(0-5)	210	232	212
(5-10)	29	57	125
10+	0	0	0

North end of Skyway to Fairview Street

This section of the highway will be constructed as part of the Stage 1 redevelopment. The following summary tables have, however, been included in order to provide an understanding of the noise effects of the combined Stage 1, 2 and 3 Queen Elizabeth Way redevelopment.

SKYWAY TO FAIRVIEW STREET (WEST SIDE)

Noise level in dBA (Leq. 24)	Number of houses subject to noise levels		
	Existing (1980)	Future (2001)	
		Without noise barrier	With noise barrier (proposed)
75+	0	0	0
70-75	10	0	0
65-70	29	18	0
60-65	110	126	70

SKYWAY TO FAIRVIEW STREET (WEST SIDE)

Noise level change in dBA	Number of houses subject to noise level change (1980-2001)	
	Without noise barrier	With noise barrier (proposed)
10+	0	0
(5-10)	0	0
(0-5)	62	0
(0-5)	88	158
(5-10)	4	38
10+	0	0

SKYWAY TO FAIRVIEW STREET (EAST SIDE)

Noise level in dBA (Leq 24)	Number of houses subject to noise levels	
	Existing (1980)	Future (2001)
75+	0	0
70-75	1	0
65-70	7	15
60-65	21	16

SKYWAY TO FAIRVIEW STREET (EAST SIDE)

Noise level change in dBA	Number of houses subject to noise level change (1980-2001)
10+	0
(5-10)	0
(0-5)	12
(0-5)	10
(5-10)	0
10+	0

Fairview Street to Guelph Line

This area is a mix of industrial, residential and open space uses. At the present time there are 121 homes experiencing noise levels in excess of Leq=60 dBA. The noise levels at these homes will increase as traffic volumes increase. In addition minor realignments and interchange construction will result both in small increases and decreases in noise levels. The existing and future noise levels and anticipated noise level changes for this section are summarized below:

FAIRVIEW STREET TO GUELPH LINE

Noise level in dBA (Leq 24)	Number of houses subject to noise levels	
	Existing (1980)	Future (2001)
75+	0	0
70-75	24	10
65-70	21	24
60-65	76	125

FAIRVIEW STREET TO GUELPH LINE

	Noise level change in dBA	Number of houses subject to noise level change (1980-2001)
Increase	10+	0
	(5-10)	0
	(0-5)	54
Decrease	(0-5)	0
	(5-10)	0
	10+	0

3.2.5 Historical Resources

The Ministry of Transportation and Communications has carried out a heritage study and documented this within "An Investigation of Historical Resources, Queen Elizabeth Way, Guelph Line to Highway 20 - Revised March 1981". This report provides a full description of the historical background and historical resources associated with the Queen Elizabeth Way redevelopment. The following discussion only highlights those features that are relevant to the Stage 2 and Stage 3 redevelopment of the Queen Elizabeth Way.

The study area has a variety of land uses which reflect differing settlement patterns, local conditions, and the history of municipal development of those portions of the City of Hamilton (originally part of Saltfleet Township) and Burlington (originally part of Nelson Township) which are involved in this project. Much of the highway development extends along the Burlington and Hamilton Beach Strip, which has had a long and colourful history of development.

In Burlington, the highway corridor passes through the built-up area of the city. This is characterized by residential, commercial, and some agricultural land use.

EXISTING CONDITIONS

On the east side of the existing Queen Elizabeth Way at Maple Avenue, there is a market garden community which developed from the 1870's. Today, most of the farms once located between Plains Road and the Rambo-Hager Creek Diversion have been purchased and cleared by developers and await commercial and residential use. The outlines of farmsteads and foundation remains may be seen. South of the Creek Diversion and approaching Highway 2 a number of mid-to-late nineteenth century brick and frame farmhouses may be observed, some accompanied by barns or greenhouses. Farm establishments which preceded the garden era were adapted to the profitable fruit and vegetable production. Considerable residential infill in this area has occurred.

Along the Beach Strip between Burlington and Hamilton the existing Queen Elizabeth Way, including the Burlington Skyway, extends along the four-mile long sand strip which divides Burlington Bay from Lake Ontario. The Burlington Skyway, opened in 1958, is a prominent landmark. The Beach Strip contains many cottage homes which are located along the culs-de-sac extending from each side of Beach Boulevard. These cottages were converted in the 1930's - 1940's into year round residences. There are also a small number of stores, restaurants, churches, and a public school which have served the Beach community. Remnants of the fashionable nineteenth century resort era of the Beach Strip also survive. It is apparent, however, that a considerable decline in the vitality of the strip has occurred with the removal of houses and other buildings over the past several years. This has been accompanied by a steady population decrease, and the closing of various services, including stores. The Bell Cairn Public School closed in the spring of 1981. Both the Halton Region Conservation Authority and the Hamilton Region Conservation Authority have been acquiring properties in accordance with their waterfront plans.

Since 1970, the Ministry of Transportation and Communications has purchased and removed 104 houses on a voluntary sales basis, in anticipation of the future property requirements for the Queen Elizabeth Way redevelopment. The Queen Elizabeth Way redevelopment corridor is situated at the end of the residential culs-de-sac located on the west side of the Beach Strip.

The majority of the homes are modest, frame 1900-1940, one or two storeys in height, with wood siding or clad in aluminum siding, stucco, or insulbrick. These houses range broadly in terms of condition, from deteriorated to good. One brick house was noted, one and a half storeys in height, circa 1920. There are relatively few brick houses located on the Beach Strip.

Worthy of note of the houses, located within the study corridor, are two large two storey houses, built circa 1930, which are located opposite Fifth Avenue. According to one of the owners, these houses, in addition to three or four others on adjacent lots, were built by one family for the use of their children as summer houses. These two houses contained a storage area beneath the first storey for boats using the harbour. Today, these spaces are filled in with concrete blocks. Also of interest is an earlier built residence, circa 1900, of frame construction with twin peaks in the front gable located in the vicinity of a small one and a half storey frame, insulbrick siding house with a curious bay on the south-east corner and a stuccoed, frame house, circa 1930 with an asymmetric facade and with a wooden porch.

Adjacent to the Queen Elizabeth Way is a brick toll station, once operated by the Ontario Department of Highways, which is currently unused and boarded up.

A variety of trees and shrubs are planted in the rear yards of homes located adjacent to the Queen Elizabeth Way and along the highway right-of-way. According to the Landscape Planning and Operations Section of the Ministry of Transportation and Communications tree species include willow, poplar, ash, silver maple, white elm and shrubs include wild cherry, plum and Manitoba maple. This vegetation ranges between 20-50 years old. Approximately 20 years ago, the Ministry of Transportation and Communications added some plantings to the Queen Elizabeth Way right-of-way in the Beach Strip area. Although there are no unique tree species present in this area, the existing vegetation adds to the aesthetics of the area.

Within the City of Hamilton the Hamilton-Wentworth Water Treatment Plant is located adjacent to the existing Burlington Street interchange. The site contains a stone pumping station, completed in 1859, and associated brick buildings. The pumping station complex is recognized to be a historical site of national, prominence.

A brief chronological development of the area, with particular emphasis on the Beach Strip is as follows:

- The first exploration of the area by Europeans may have been about 1620 but the first documented evidence of European exploration of the area was in 1669.
- Settlement of the area by Europeans started in 1785 following the purchase of an extensive tract of land from the Mississaugua Indians in 1784.
- A land grant of 3,450 acres was given to Joseph Brant in 1798. This land was located at the north end of the Beach Strip in what is now known as Burlington.
- A 30' wide canal was constructed across the Beach Strip in 1826, in the location of the existing canal.
- A rail line was constructed across the Beach Strip in 1876. This construction included a bridge over the canal.
- A radial electric line was completed between Burlington and Hamilton, including a second bridge over the Canal, in 1897.
- Recreational usage of the Beach Strip became very popular during the mid 19th century with numerous hotels being constructed.
- Deterioration of the water quality in the Harbour was suspected during the 1890's and by the 1920's it was rapidly declining.
- The first paved roadway was constructed across the Beach Strip in 1923.
- The Queen Elizabeth was formally opened as an expressway between Toronto and Niagara in 1939. At that time the roadway crossed the Burlington Canal on a lift bridge that has subsequently been removed.
- The Burlington Bay Skyway was opened to traffic in 1958.

3.2.6 Archaeological Resources

The Ministry of Transportation and Communications retained DelCan and PaleoPlan Inc. to carry out an archaeological survey, in the Queen Elizabeth Way corridor during 1980. The results of this survey were documented in a report "Archaeological Survey and Heritage Resource Assessment-Queen Elizabeth Way, Hamilton/Burlington Section, Highway 20 to Guelph Line" dated March 1981. This report is available for review within the offices of the Ministry of Transportation and Communications.

The survey consisted of a literature review, map and air photo interpretation, meetings with the Ministry of Culture and Recreation's regional archaeologist and a field survey.

Reference to eighteen known archaeological sites, located within or immediately adjacent to the highway corridor between Highway 2 and Plains Road, were obtained prior to the field review. No additional sites were identified during the field review and in fact artifactual materials were encountered at only six of the eighteen previously recorded sites.

All of the identified sites fall within the section of the Queen Elizabeth Way that is to be constructed in Stage 1. No archaeological sites were identified that would be affected by the Stage 2 or Stage 3 redevelopment of the Queen Elizabeth Way.

3.3 TRANSPORTATION AND ENGINEERING DATA

3.3.1 Existing Roadway Network

The Queen Elizabeth Way forms part of the provincial highway network at the west end of Lake Ontario, providing the only freeway link between Toronto and Niagara Falls/Fort Erie.

Within the immediate study area of the Queen Elizabeth Way between Guelph Line in Burlington and Highway 20 in Hamilton, there are two other provincial highways that intersect with the Queen Elizabeth Way. These are Highway 403 and Highway 20.

The Queen Elizabeth Way is a six lane divided freeway from Highway 403 in Burlington to Toronto and is a four lane divided freeway from Highway 403 to Fort Erie. Access points from the Queen Elizabeth Way to the City of Burlington are provided at Guelph Line, Plains Road and Highway 2. Main access points to the east end of the City of Hamilton are provided at Burlington Street and Highway 20.

Highway 403 is a fully controlled access freeway presently completed between the Queen Elizabeth Way in Burlington and Highway 2 in the vicinity of Ancaster. The section between Burlington and Hamilton is a six-lane facility providing access to the west end of the City of Hamilton at York Boulevard, Main-King Streets and Aberdeen Avenue.

Highway 20 is a four-lane arterial highway which serves as the easterly perimeter link, between the Queen Elizabeth Way and Highways 53 and 403, around the City of Hamilton.

Most of the existing municipal roads in the study area form a grid pattern which is orientated to the Lake Ontario shoreline. Since the Queen Elizabeth Way was built along existing roads over most of its length, the local roads are primarily parallel or perpendicular to it.

The following roads are either connected to, or grade separated at the Queen Elizabeth Way within the study limits:

Guelph Line (4 lanes)	- interchange
Brant Street (4 lanes)	- grade separation
Highway 403 (6 lanes)	- interchange
Plains Road (4 lanes)	- partial interchange
Highway 2 (2 lanes west & 4 lanes east)	- interchange
Woodward Avenue (4 lanes)	- grade separation
Burlington Street (4 lanes)	- interchange
Highway 20 (4 lanes)	- interchange

Figure 7 identifies the existing roadway network within the study area.

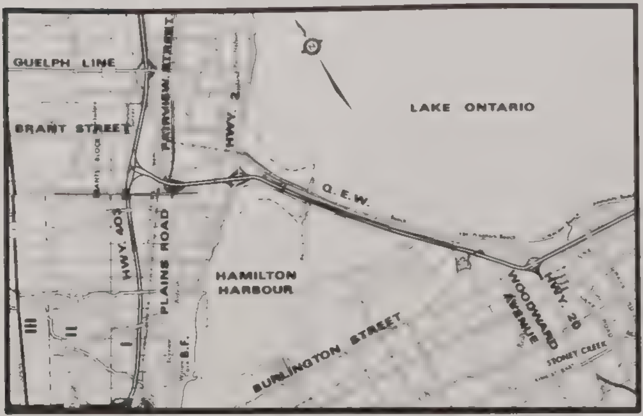
3.3.2 Future Roadway Network

In the future, improvements to existing links as well as the development of new links in the Provincial Highway network will be constructed to meet the transportation needs in the area. These are identified in a report "Future Perspective - Provincial Highways 1981-2001" which is updated annually.

In particular, the Ministry of Transportation and Communications' long range plan indicates a need for eight lanes on the Queen Elizabeth Way between Oakville and Highway 20 in Hamilton and a need for six lanes between Highway 20 and Niagara Falls. In the corridor between Hamilton and Niagara Falls, the Ministry of Transportation and Communications had considered the construction of a mid-peninsula freeway during the late 1960's/early 1970's but this was discarded in view of the minor transportation benefits that would have been derived in comparison to the environmental and social impacts that would have been caused.

Long range plans for the section of Highway 403 between Burlington and Toronto recommend the future construction of Highway 403 parallel to and north of the Queen Elizabeth Way as a six-lane divided freeway. Designation

EXISTING CONDITIONS



SCALE: 1" = 1·7 MILES

Figure 7

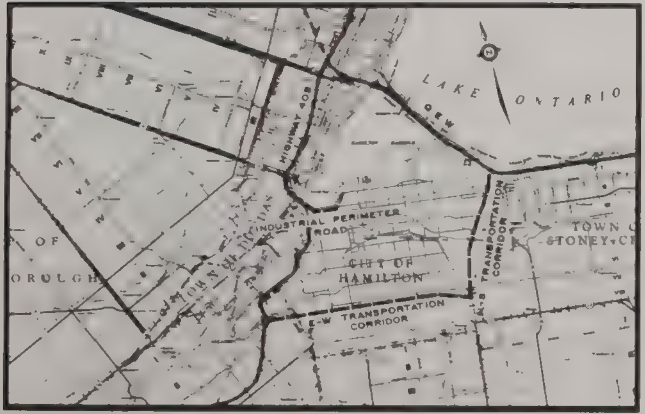
EXISTING ROADWAY NETWORK

plans indicating the route for Highway 403 were filed in the Registry Office in 1962. The first section of this freeway to be constructed will be the link between Highway 401 in Mississauga and the Queen Elizabeth Way in Oakville. Construction on this link was underway as of the time of preparing this report. It is anticipated that construction will be complete by late 1982. The section of Highway 403 between Mississauga and Burlington is a part of the Parkway Belt and as such is approved for construction. It is anticipated to be open by the early 1990's.

In the mid 1950's, the City of Hamilton investigated the development of a new freeway to interconnect Highway 8 at the east end of the City to the Queen Elizabeth Way in the vicinity of Highway 20. This facility, commonly referred to, at that time, as the Red Hill Creek Freeway was also identified as part of a necessary future link between the Queen Elizabeth Way and the Mountain Freeway in the City's Transportation Plan that was completed in 1963. Since that time there has been considerable discussion and controversy over the possible future development of both the Red Hill Creek Freeway and the Mountain Freeway. As of the time of preparing this report, a study was being carried out by the Regional Municipality of Hamilton-Wentworth to prepare an Environmental Assessment for a new 'North-South Transportation Corridor' and a new 'East-West Transportation Corridor'.

Figure 8 illustrates the possible future roadway network in the study area including the 'North-South Transportation Corridor' and the 'East-West Transportation Corridor'.

The following table summarizes the present and proposed development of the freeways within the study corridor to the year 2001:



SCALE: 1" = 3·4 MILES

Figure 8

FUTURE ROADWAY NETWORK

FREEWAY DEVELOPMENT
(Number of Lanes)

	PRESENT	PROPOSED
Q.E.W. (Oakville to Highway 403 in Burlington)	6	8
Q.E.W. (Highway 403 in Burlington to Highway 20 in Hamilton)	4	8
Q.E.W. (Highway 20 in Hamilton to St. Catharines)	4	6
Highway 403 (Hamilton to Burlington)	6	8
Highway 403 (Oakville to Burlington)	-	6
Highway 403 (Mississauga to Oakville)	-	6
North-South Transportation Corridor	-	4 or 6 (1)

(1) subject to ongoing study by Region of Hamilton-Wentworth

In the late 1960's, the then Town of Burlington completed a comprehensive Traffic Planning Study which included recommendations on the future arterial road network required to meet the needs of the municipality. One of the major recommendations included in the study was the development of a new east-west arterial road, Fairview Street, between Plains Road just west of the Queen Elizabeth Way and Burloak Drive at the east limit of the municipality.

EXISTING CONDITIONS

As of the time of preparing this report, the roadway was complete between Brant Street and Appleby Line. When the new roadway is complete, Plains Road will be realigned east of the Queen Elizabeth Way to intersect with the new Fairview Street as part of the Stage 1 Queen Elizabeth Way redevelopment.

The City of Hamilton's Transportation Plan, completed in 1963, recommended the development of an East-West Freeway connecting the Queen Elizabeth Way at the east of the City and Highway 403 at the west of the City. This "mid-town" roadway would have been north of the central business district, however, subsequent planning work determined that the cost and social disbenefits associated with this facility were 'too high'. As an alternative solution to the transportation problem in this corridor, the City commenced a program to upgrade the 'Industrial Perimeter Road' system around the Hamilton Harbour. This work has included extensive reconstruction of Burlington Street.

At the time of preparing this report, the Region of Hamilton-Wentworth was proceeding with the reconstruction of Burlington Street east from Kenilworth Avenue towards the Queen Elizabeth Way.

The following table summarizes the present and proposed development of the arterial roadways within the study corridor:

ARTERIAL DEVELOPMENT
(Number of Lanes)

	PRESENT	PROPOSED
Guelph Line	4	6
Brant Street	4	6
Plains Road	4	4(1)
Fairview Street	-	6(1)
Highway 2 (East of Q.E.W.)	4	4
Highway 2 (West of Q.E.W.)	2	2
Woodward Avenue	4	4
Burlington Street	4	8(2)

(1) Plains Road will be realigned east of the Queen Elizabeth Way to intersect with Fairview Street. Plains Road west of the Queen Elizabeth Way will become continuous with Fairview Street east of the Queen Elizabeth Way.

(2) The proposed Burlington Street reconstruction between Kenilworth Avenue and Parkdale Road will provide 4 elevated lanes and 4 at-grade lanes.

3.3.3 Existing Highway

The existing Queen Elizabeth Way has a six lane cross section from Guelph Line to Highway 403 and a four lane cross section from Highway 403 to Highway 20. With the completion of the approved Stage 1 redevelopment of the Queen Elizabeth Way the six lane section will have been extended from Highway 403 to Highway 2 and a new arterial will have been constructed across the Beach Strip.

The median width varies throughout the project. At Guelph Line the median width is 6 m. Between Guelph Line and Highway 403 it is generally 10.5 m and between Highway 403 and Highway 2 it is 8.5 m. Between Highway 2 and Woodward Avenue, including the Burlington Skyway, the median width is 1.8 m - 3.0 m. South of Woodward Avenue the median widens to 8.5 m and continues at 8.5 m through to Highway 20.

The alignment of the Queen Elizabeth Way allows for a posted speed of 100 km/h except at the ramp from Toronto to Niagara Falls, through the Queen Elizabeth Way/Highway 403 interchange. At this location an advisory speed limit of 80 km/h is posted to negotiate a 250 m curve.

Existing interchanges are provided as follows:

Guelph Line	- All moves.
Plains Road East	- Between Plains Road to the west and the Queen Elizabeth Way towards Toronto.
Highway 403	- Between Highway 403 towards Hamilton and the Queen Elizabeth Way. (1)
Plains Road West	- Between Plains Road to the east and the Queen Elizabeth Way towards Niagara. (1)
Highway 2	All moves. (1)
North Access	- Between New Arterial and the Queen Elizabeth Way towards Toronto. (1)
South Access	- Between New Arterial and the Queen Elizabeth Way towards Niagara. (1)
Woodward Avenue	- Between New Arterial and the Queen Elizabeth Way towards Toronto (1)
Burlington Street	- All moves.
Highway 20	- All moves.

(1) These interchanges will be constructed/reconstructed as part of the approved Stage 1 redevelopment of the Queen Elizabeth Way.

3.3.4 Existing Burlington Skyway

The existing Burlington Skyway was opened to traffic in 1958. It carries the Queen Elizabeth Way over the Burlington Canal, providing minimum navigable clearances of 36.6 m vertically and 91.4 m horizontally. The steel structure has a constant 3% grade on the approaches to the crest and is 2,560 m long consisting of 75 spans. The three central spans form a continuous arched truss of which the middle span is 151 m in length.

The structure cross section provides for two 3.65 m lanes in each direction separated by a 1.8 m median.

The specific life expectancy of the existing Skyway can not be predicted with accuracy although the Ministry of Transportation and Communications' Structural Office has estimated that it has a residual life expectancy of 50 years subject to good maintenance practices.

3.3.5 Existing Traffic

The Queen Elizabeth Way between Burlington and Hamilton provides service to both local and long distance through traffic. A large proportion of the local traffic is comprised of commuters between Hamilton and Burlington. The major proportion of the through traffic is either commercial, tourist or recreational in character.

The 1980 Annual Average Daily Traffic (A.A.D.T.) and Summer Average Daily Traffic (S.A.D.T.) on the Queen Elizabeth Way between Burlington and Hamilton were as follows:

	A.A.D.T.	S.A.D.T.
Walkers Line		
	77,100	88,700
Guelph Line		
	64,300	73,900
Plains Road (E. Jct.)		
	77,750	89,400
Highway 403		
	52,100	63,600
Plains Road (W. Jct.)		
	52,300	63,800
Highway 2		
	60,000	73,200
North Access		
	56,900	69,400
South Access		
	57,500	70,200
Burlington Street		
	52,650	64,200
Highway 20		
	36,750	43,700
Fruitland Road		

Traffic volumes on the Queen Elizabeth Way have grown consistently since the opening of the Skyway. The following volumes represent the Annual Average Daily Traffic (A.A.D.T.) on the Skyway since 1960.

1960 - 17,000 A.A.D.T.
1965 - 27,500 A.A.D.T.
1970 - 34,600 A.A.D.T.
1975 - 47,450 A.A.D.T.
1980 - 56,900 A.A.D.T.

In addition to the Queen Elizabeth Way crossing of the Burlington Canal the Beach Boulevard crossing of the Canal via the lift bridge has been carrying in excess of 10,000 A.A.D.T. since the mid 1960's.

The combination of Queen Elizabeth Way traffic and Beach Boulevard traffic results in a corridor demand volume in the order of 67,000 A.A.D.T. at the present time.

The Queen Elizabeth Way is subject to significant increases in traffic during the summer. For example, although Annual Average Daily Traffic on the Skyway during 1980 was just in excess of 56,900, the Summer Average Daily Traffic during the months of July and August was in the order of 69,400.

Other characteristics of the existing traffic on the Queen Elizabeth Way between Burlington and Hamilton include a design hour volume of 12% and a truck percentage of 12% during the design hour. The truck percentage on an annual basis is approximately 16%.

Figures 9 and 10 provide a graphical representation of the seasonal and weekly variations in traffic on the Burlington Skyway.

The number of accidents and the accident rates associated with these traffic volumes has grown as traffic volumes have increased. This is illustrated graphically in figure 16. The distribution of these accidents through the day and through the week is illustrated graphically in figure 11.

3.3.6 Future Traffic

Future (year 2001) traffic volumes for the corridor were generated by the Ministry of Transportation and Communications' Urban and Regional Transportation Planning Office (now a part of the Highway Program Development Branch). The assumptions that apply to these predictions are as follows:

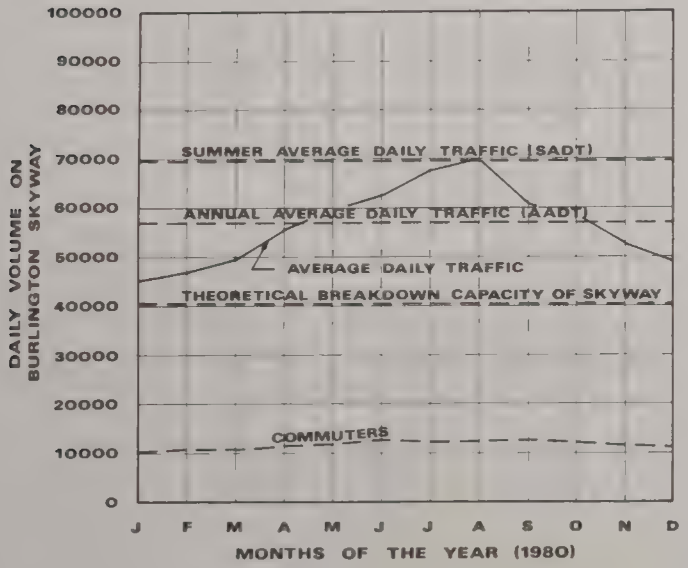


Figure 9

SEASONAL TRAFFIC VARIATIONS
ON BURLINGTON SKYWAY

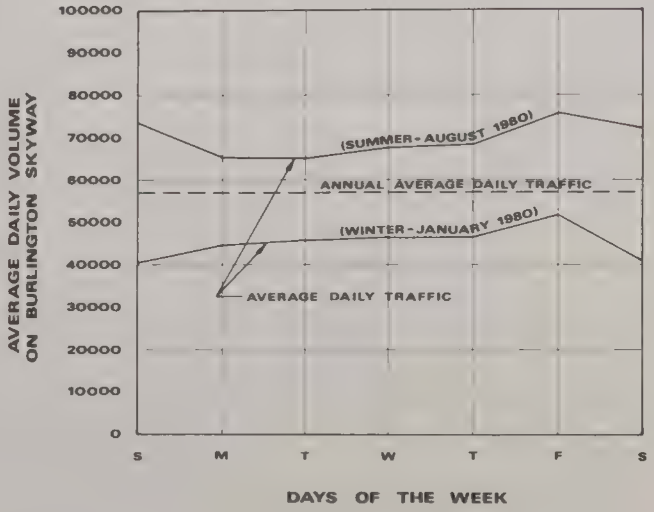


Figure 10

DAILY TRAFFIC VARIATIONS
ON BURLINGTON SKYWAY

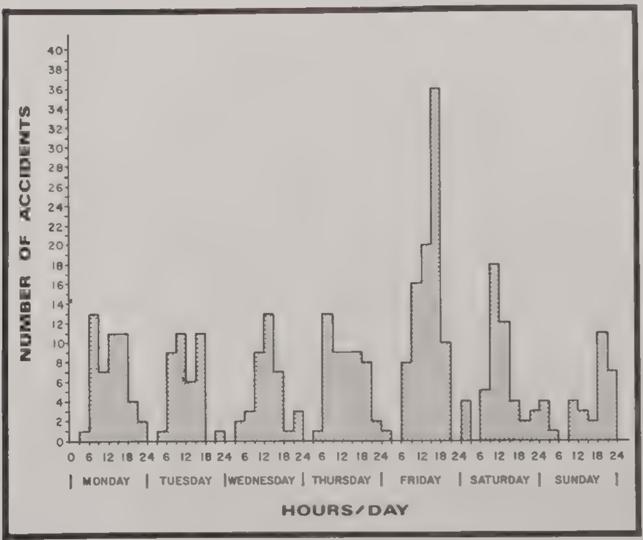


Figure 11

TOTAL NUMBER OF ACCIDENTS
1978 - 1980

Land use will occur as indicated in the Hamilton-Wentworth and Halton official plans.

(During the time that this Environmental Assessment report was being prepared, (fall 1981) the Regional Municipality of Hamilton-Wentworth announced revised population projections for the year 2001. The revised figures reduced the year 2001 population projections from 550,000 to 445,000. The Ministry of Transportation and Communications has assessed the impact of this on the future traffic projections for the Queen Elizabeth Way corridor and has estimated that the revised population projections will reduce the year 2001 traffic projections within the Queen Elizabeth Way corridor by 5% - 6%. The Ministry of Transportation and Communications does not consider this to be a sufficient change to warrant a modification in the recommendations related to the long term redevelopment of the Queen Elizabeth Way. The revised population projections do not of course affect the existing deficiencies in the corridor. The traffic projections that are included in this chapter are those that were made prior to the announcement by the Region of Hamilton-Wentworth.)

- Per capita vehicle registration and usage will occur as predicted (i.e. as an extension of present trends and assuming continued fuel availability).

- International traffic will form a similar percentage of the total traffic in the future, as it has in the past.

- Highway 5 will have been constructed to a four lane cross section from Oakville to Highway 6. Fairview Street and New Street will have been constructed across the Bronte Creek. These improvements together with the existing network were taken as the 'base' network for analysis purposes.

- Interchanges will exist on the Queen Elizabeth Way as proposed as part of the complete (Stages 1, 2 and 3) redevelopment.

EXISTING CONDITIONS

Based on these assumptions, link volume assignments were generated for seven alternative networks. These networks were as follows:

Network 1 - Base network.
Network 2 - Base network plus Industrial Perimeter Road.
Network 3 - Base network plus 'North-South Transportation Corridor' and 'East-West Transportation Corridor'.
Network 4 - Base network plus 'North-South Transportation Corridor', 'East-West Transportation Corridor' and Industrial Perimeter Road.
Network 5 - Base network plus Highway 403 from Freeman Interchange to Highway 5 including an interchange at Upper Middle Road.
Network 6 - Base network plus Highway 403 from Freeman Interchange to Toronto.
Network 7 - Base network plus 'North-South Transportation Corridor', 'East-West Transportation Corridor' and Highway 403 from Freeman Interchange to Toronto.

The resulting link volumes (A.A.D.T.) on the Queen Elizabeth Way were as follows:

INTERCHANGING ROADWAY

NETWORK	Guelph Line		Brant St.		Highway 403		Fairview St.		Highway 2		Burlington St.		North-South Transp. Corridor		Highway 20
1		115,000		104,000		89,000		95,000		100,000		110,000		110,000	
2		115,000		106,000		81,000		85,000		90,000		110,000		110,000	
3		115,000		104,000		77,000		83,000		88,000		100,000		110,000	
4		115,000		106,000		73,000		77,000		82,000		100,000		110,000	
5		103,000		93,500		92,500		95,000		100,000		110,000		110,000	
6		85,000		75,500		92,500		95,000		100,000		110,000		110,000	
7		85,000		85,000		88,000		83,000		88,000		100,000		100,000	

The figures indicated for the section between Highway 2 and Burlington Street represent the corridor volume crossing the Burlington Canal. This volume will include traffic on both the Queen Elizabeth Way and the approved arterial along the Beach Strip.

The following characteristics are expected to be applicable to the year 2001 assignments:

- It is assumed that truck percentages on the Queen Elizabeth Way by 2001, will be similar to today's conditions at about 12% in the peak hour and 16% on an annual basis. (In this regard the volume of trucks that will use the new "roll on-roll off" ferry service across Lake Ontario, from Oshawa, will be insignificant in comparison to the total truck traffic in the Queen Elizabeth Way corridor. Therefore, the 12% truck percentage is not projected to be significantly different either with or without the "roll on-roll off" ferry service.)

- A directional split of 60/40 is forecast.

- The design hour volume is expected to be approximately 12% of the A.A.D.T.

- The weekday composition of traffic in the Skyway corridor is anticipated to be as follows:

  - o Through traffic 27% (neither trip end in Hamilton or Burlington).
  - o Local traffic 35% (both trip ends in Hamilton or Burlington).
  - o Destined traffic 38% (one trip end in Hamilton or Burlington).

- The modal split within the corridor will be 5% (i.e. proportion of roadway users on transit).

Specific turning volume assignments have been generated for each of the interchanges on the Queen Elizabeth Way. These have not been included within this report but they may be reviewed within the offices of the Ministry of Transportation and Communications.

3.3.7 Highway Capacity

The existing and future traffic volumes within the corridor provide the basis for the analysis of the operation of the roadway.

The operation is calculated on the basis of a methodology that is documented in "The Highway Capacity Manual" (H.C.M.). This manual was published in the United States, by the Highway Research Board in 1965. (Ministry of Transportation and Communications staff participates in the various committees of this Board). Even though the manual has been in existence for a number of years and was in fact developed on the basis of empirical data gathered in the United States, it has been found to be directly applicable to Ontario roadways and has provided the basis for the analysis of highways in Ontario for many years. The manual is presently being updated by the Highway Research Board but it is not anticipated that major adjustments will occur as a result of this update.

The manual defines a number of operating conditions related to "levels of service". These are as follows:

Level of Service A
"Free-flow operation is defined as that flow condition in which a vehicle essentially is not affected by other vehicles in the traffic stream, and selection of speed is based on the individual driver's choice and on roadway design features".

Level of Service B
"Level of service B is in the higher speed range of stable flow. For freeways and expressways, it is defined by the requirements that operating speeds be at or greater than 55 m.p.h. (90 km/h) and that the service volume on two lanes in one direction not exceed 50 percent of capacity. This gives a maximum service volume of 2,000 passenger cars per hour total for two lanes in one direction under ideal conditions (or an average of 1,000 passengers cars per lane per hour). If an operating speed of 55 m.p.h. (90 km/h) for through traffic cannot be maintained for this service volume, the quality of service does not meet the requirement for level B."

Level of Service C
"Further increases in demand volume are accompanied by a resultant decrease in operating speeds, into level of service C. Operation at this level,

although still in the range of stable flow, is critical enough so that, unlike levels A and B, rates of flow within a period shorter than an hour must be considered. For freeways, a 5-min short period has been adopted as the standard. In general, the requirements for level of service C are an operating speed of at least 50 m.p.h. (80 km/h) and a service flow rate on two lanes in one direction not exceeding 75 percent of the capacity rate, with service volumes developed from these rates through application of the appropriate peak-hour factor. Further, under ideal conditions, for two lanes in one direction, the peak 5-min flow rate cannot exceed 3,000 passenger cars per hour total for one direction (an average of 1,500 passenger cars per lane per hour)."

Level of Service D
"For level of service D, as for level of service C, any discussion of freeway volume must be qualified by consideration of the peak-hour factor.
In level D, which is in the lower speed range of stable flow with volumes higher than in level C, traffic operation approaches instability and becomes very susceptible to changing operating conditions. Operating speeds generally are in the neighbourhood of 40 m.p.h., (65 km/h) and service flow rates do not exceed 0.90 of capacity rates (with service volumes again obtained through application of the appropriate peak-hour factor). Under ideal conditions on a four-lane freeway the peak 5-min flow rate cannot exceed 3,600 passenger cars per hour, total for one direction (an average of 1,800 passenger cars per lane per hour)."

Level of Service E
"Level of service E is the area of unstable flow, involving overall operating speeds of about 30-35 m.p.h., (50-60 km/h) and involving volumes approaching and at capacity, or about 2,000 passenger cars per lane per hour under ideal conditions. Service volume is almost strictly regulated by the capacity at critical locations, with traffic being metered through each restriction, but demand does not greatly exceed capacity, so long backups do not develop upstream. Operating conditions may involve either fairly uniform speeds of about 50 percent of free-flow operating speed through the entire section, or a more intermittent type of operation upstream from a constriction where storage is taking place: such constrictions may be either permanent (inherent in the geometrics), or temporary, such as minor accidents or broken-down vehicles."

Level of Service F
"This level describes a forced-flow condition in which the expressway acts as storage for vehicles backing up from a downstream bottleneck. Operating speeds range downward from those at capacity (at or near 30 m.p.h., 50 km/h) to those during stop-and-go type operation, and can drop to zero in the extreme case of a complete jam. Volumes vary widely, depending principally on downstream capacity. This service is unacceptable."

The Highway Capacity Manual also includes a photograph of a freeway operating under the various levels of service. This is included in this report as figure 12.

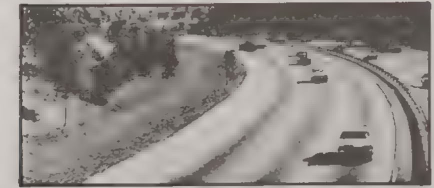
As can be seen from these levels of service, level of service E represents the "theoretical breakdown capacity" of the roadway. This is the level beyond which it is not normally possible to pass more vehicles in any given hour even though under ideal conditions this can occasionally happen.

When the theoretical breakdown capacity of the highway is exceeded, the periods of time over which it is operating at capacity extend from the peak hour to other times of the day and this increases the probability of slow downs or stoppages occurring.

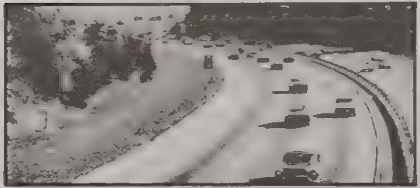
The Ontario Ministry of Transportation and Communications uses level of service D, which is at approximately 90% of theoretical breakdown capacity, as the minimum design level of service at the end of the planning period, where this can be achieved.

The calculation of level of service takes a large number of factors into consideration these include:

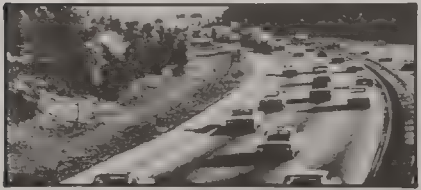
o Traffic volumes



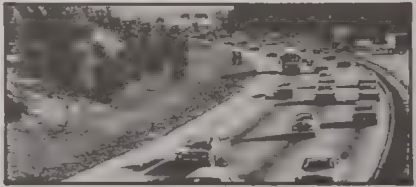
Level of Service A



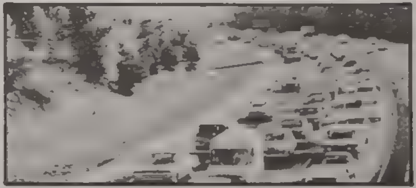
Level of Service B



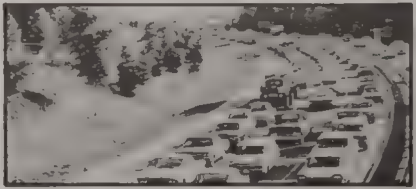
Level of Service C



Level of Service D



Level of Service E



Level of Service F

Figure 12

LEVELS OF SERVICE

- Truck percentages
- Number of lanes
- Lane width
- Lateral clearance
- Grades
- Weaving sections
- Ratio of peak hour to daily traffic
- Directional split
- Entry and exit ramp volumes
- Traffic signal operation
- Parking
- Intersection operation

(The last three considerations only apply to roadways without access control).

In the case of the crossing of the Burlington Canal, the following capacity calculations were carried out:

- Theoretical Freeway Capacity = 2,000 NWTc as per page 265 of Highway Capacity Manual (H.C.M.).
    - capacity is calculated in vehicles per hour in one direction.
    - N is the number of lanes (one direction).
    - W is an adjustment for lane width and lateral clearance.
    - Tc is an adjustment for the percentage of trucks.

- Traffic conditions applicable to the canal crossing are as follows:
    - trucks comprise 12% of the total freeway traffic during the peak hour.
    - the ratio of the opposing volumes (directional split) during the peak hour is 60%-40%.
    - the design hour volume (DHV) is 12% of the annual average daily traffic (AADT). i.e. 12% of the AADT represents a typical peak hour.
    - Skyway grade is 3% for 1300 m up and 1300 m down.
    - Tc for at grade condition = 0.89 as per table 9.4, page 258 of H.C.M. and table 9.6, page 261 of H.C.M.
    - Tc for Skyway grade = 0.68 as per table 9.4, page 258 of H.C.M. and table 9.6, page 261 of H.C.M.
    - W = 1 for Skyway as per table 9.2, page 256 of H.C.M.

- Capacity of Skyway is

$= 2{,}000 \times N \times W \times Tc$ per hour/one way

$= 2{,}000 \times N \times W \times Tc \times \frac{1}{0.6} \times \frac{1}{0.12}$ per day/both ways

(0.6 factor corrects for directional split and 0.12 factor converts from DHV to AADT)

$= 2{,}000 \times N \times 1 \times 0.68 \times \frac{1}{0.6} \times \frac{1}{0.12}$

- 20,000 x N(approximately) where N = number of lanes each way

Therefore:-

4 lane Skyway capacity = 2 x 20,000 = 40,000 (1)
6 lane Skyway capacity = 3 x 20,000 = 60,000
8 lane Skyway capacity = 4 x 20,000 = 80,000 (2)
10 lane Skyway capacity = 5 x 20,000 = 100,000 (3)
(1) = Existing
(2) = Stage 2 improvement
(3) = Stage 3 improvement

These figures represent theoretical breakdown capacity. The provincially accepted minimum design level of service is at approximately 90% of this capacity.

- Theoretical two way capacity of a two lane arterial is
= 2,000 x W x T per hour of green time (green time is the amount of time that traffic signals are on green as opposed to red or amber) as per page 309 of H.C.M.

$= 2{,}000 \times 1 \times 0.89 \times \frac{1}{2 \times 0.6} \times \frac{1}{0.12} \times 0.8$/per day

(2 x 0.6 factor corrects for directional split, 0.12 factor converts from DHV to AADT and 0.8 factor allows for 20% loss of green time at the lift bridge and other traffic signals)
= 10,000±

- o Theoretical one way capacity of a four lane arterial is:
  2,000 x 2 x W x T per hour of green time as per page 294 of H.C.M.
  $= 2{,}000 \times 2 \times 1 \times 0.89 \times \frac{1}{0.6} \times \frac{1}{0.12} \times 0.6$ per day
  (0.6 factor corrects for directional split, 0.12 factor converts from DHV to AADT and second 0.6 factor allows for 40% loss of green time at the lift bridge and at the additional signals that will be required on the new arterial)
  = 30,000±

- o Summary Theoretical Breakdown Capacities:-

	Skyway	Arterial	Total
Existing	40,000	10,000	50,000
Stage 1	40,000	30,000	70,000
Stage 2	80,000	30,000	110,000
Stage 3	100,000	30,000	130,000

- o Level of Service D volumes (i.e. the Ministry of Transportation and Communications' design level of service volumes) that correspond to the calculated capacities are based on 90% of the theoretical breakdown capacity:-

	Skyway	Arterial	Total
Existing	36,000	9,000	45,000
Stage 1	36,000	27,000	63,000
Stage 2	72,000	27,000	99,000
Stage 3	90,000	27,000	117,000

- o For comparison purpose, the 1980 corridor traffic counts were as follows:

Winter Average Daily Traffic = 56,900
Annual Average Daily Traffic = 66,900
Summer Average Daily Traffic = 81,600

Figure 13 illustrates the theoretical breakdown capacity of the Skyway following each Stage of construction of the Queen Elizabeth Way versus the projected traffic growth.

Comparable calculations for other sections of the Queen Elizabeth Way do not take the long Skyway grade into consideration, but do allow for weaving and exit and entry ramp conflicts.

A summary of the theoretical breakdown capacity (excluding weaving and entry and exit ramp conflicts) for the other sections of the Queen Elizabeth Way is as follows:

4 lanes - 50,000 A.A.D.T.
6 lanes - 75,000 A.A.D.T.
8 lanes - 100,000 A.A.D.T.

3.3.8 Burlington Canal

The only water connection between Lake Ontario and the Hamilton Harbour is the Burlington Canal.

The Canal, originally constructed in 1826, was reconstructed in 1932 to provide for a navigable width of 91.44 m and a depth of 8.25 m (below a controlled low water level of 74.0 m) and is open to shipping from early April to the middle of December. The operation of the Canal is controlled by Federal regulations that are administered by Transport Canada.

The Canal is used extensively by commercial vessels, recreational vessels and by research vessels associated with the operation of the Canada Centre for Inland Waters.

Over the past 5 - 10 years the number of commercial vessels has remained fairly constant with increased tonnages of cargo being handled by

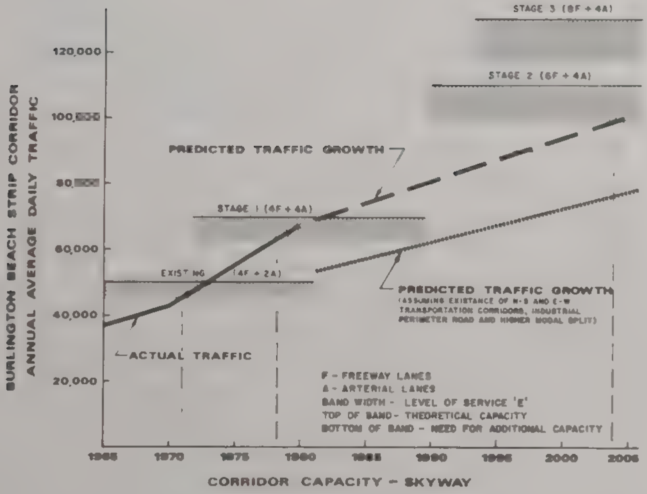


Figure 13

FUTURE TRAFFIC GROWTH

increasingly larger vessels. The Hamilton Harbour Commission's proposals to develop additional water oriented industrial lands could tend to increase the volume of commercial traffic in the future.

Although commercial traffic has remained constant over the past 5 - 10 years, the growth of recreational traffic has grown dramatically and the anticipation is that this growth will continue.

The Canal is presently crossed by the Burlington Skyway, which has a vertical clearance of 36.6 m and a lift bridge which has a vertical clearance of 3.05 m in its down position and 36.6 m in its up position.
Any roadway crossing of the Burlington Canal is required to provide the following minimum clearances in accordance with Federal requirements:

o Any facility crossing over the Canal must provide for a minimum of 36.58 m vertical clearance above a water level of 75.85 m or mechanization to allow for this full clearance whenever vessels are using the Canal as well as a minimum of 91.44 m horizontal clearance.

o Any facility crossing under the Canal must provide for a minimum of 8.25 m of draft within the Canal. The existing Canal and the entire Saint Lawrence Seaway system were constructed to provide for 8.25 m of draft. The Hamilton Harbour Commissioners have indicated that any tunnel under the Burlington Canal should provide for a minimum of 10.65 m of draft.

The 8.25 m of draft within the Saint Lawrence Seaway applies to a permanently unobstructed channel depth. A 0.91 m allowance for siltation and routine clearing is provided below the 8.25 m. In addition a further 1.52 m of granular material is provided over the top of any tunnel structures in order to protect the structure.

3.3.9 Railways

There are three Canadian National lines within the immediate study area, these are the Halton, Oakville and Beach Subdivisions.

- Halton Subdivision

The Queen Elizabeth Way overpasses the Halton Subdivision just west of Guelph Line. At this location, the line is a two track facility carrying approximately 30 scheduled train movements per day. Canadian National foresees continued growth of traffic on this line in the future.

- Oakville Subdivision

The Queen Elizabeth Way overpasses the Oakville Subdivision just north of Fairview Street. At this location, the line is a two track facility carrying approximately 80 scheduled train movements per day including 2 GO trains in the morning and evening. Canadian National foresees continued growth of traffic on this line in the future.

- Beach Subdivision

The Beach Subdivision extends from the Oakville Subdivision, across the Beach Strip to a point just north of the Highway 20/Queen Elizabeth Way interchange. The line was continuous across Highway 20 prior to reconstruction of the Highway 20/Queen Elizabeth Way interchange in the mid 1970's.

At the present time the Beach Subdivision services only one industry within Hamilton, namely Lang's Foods. There are no scheduled train movements along this single track, however, the number of movements to and from Lang's Foods is generally between two and six per week.

The lift bridge over the Burlington Canal accommodates the single track Beach Subdivision as well as a two lane roadway. This will be modified as part of the Stage 1 redevelopment of the Queen Elizabeth Way to provide a four lane roadway with the railway tracks incorporated within the roadway. However, Canadian National is presently in negotiations with the Ministry of Transportation and Communications for the removal of this line.

3.3.10 Adjacent Projects

Redevelopment of roadways within the vicinity of the section of the Queen Elizabeth Way under study includes the following:

Queen Elizabeth Way (Toronto)
The long term plan for the Queen Elizabeth Way east of Guelph Line calls for the widening of the highway from six lanes to eight lanes. No date for reconstruction has been established. Independent of the widening taking place, it is proposed to provide interchanges at Appleby Line and Burloak Drive and to improve the interchange at Walkers Line.

Queen Elizabeth Way (Niagara)
The long term plan for the Queen Elizabeth Way east of Highway 20 calls for the widening of the highway from four lanes to six lanes. No date for reconstruction has been established.

Highway 403
As of the time of preparing this report, a preliminary design was being carried out for Highway 403 from the Freeman interchange to the Oakville/Mississauga boundary. This new highway will approximately follow a route that was designated in 1962 and now forms part of the Parkway Belt west. It is anticipated that Highway 403 will be constructed as 6 lanes and that the first stage of construction will be the section from the Mississauga boundary westerly.

Burlington Street
As of the time of preparing this report, the Regional Municipality of Hamilton-Wentworth was proceeding with the reconstruction of Burlington Street from Kenilworth Avenue to just south of Parkdale Road, where the development will connect to the reconstruction of the Burlington Street/Woodward Avenue interchange that is proposed as part of the Stage 1 redevelopment of the Queen Elizabeth Way. The proposed Burlington Street reconstruction between Kenilworth Avenue and Parkdale Road will provide for the construction of 4 elevated lanes (two lanes each way) over 4 at grade lanes.

North-South Transportation Corridor

As of the time of preparing this report, the Regional Municipality of Hamilton-Wentworth was preparing an Environmental Assessment for a new 'North-South Transportation Corridor'. This roadway is proposed to interchange with the Queen Elizabeth Way mid way between Highway 20 and Burlington Street.

Fairview Street

As of the time of preparing this report the City of Burlington had recently completed construction of a grade separation of Fairview Street with the Canadian National Beach subdivision to the west of Brant St. This construction will connect to the proposed Queen Elizabeth Way/Fairview Street/Plains Road interchange that will be constructed as part of the Stage 1 redevelopment of the Queen Elizabeth Way.

3.3.11 Hamilton Harbour Commission Proposals

The Hamilton Harbour Commission has proposed an industrial development on lands located on the Hamilton Harbour side of the Beach Strip between the mouth of the Red Hill Creek and the Burlington Canal. These lands were created as a dredged spoil disposal area for the Harbour.

Plans for the development, which is know as the East Port Industrial Park, Hamilton Harbour, Piers 25-26-27, were released, by the Commission, in October 1979. Traffic forecasts given elsewhere in this report do not include any traffic generated from this development.

ALTERNATIVES AND EVALUATION

A large number of alternative methods of widening the Queen Elizabeth Way were investigated during the 1972/74 study. These were reassessed during the 1978/79 study and were documented in the 1979 Environmental Assessment submission to the Ministry of Environment. These alternatives were primarily "alternative methods of carrying out the undertaking" rather than "alternatives to the undertaking". During the 1981 reassessment of the earlier submission to the Ministry of Environment a more detailed appraisal of the "alternatives to the undertaking" has been documented.

This section of the report is structured to deal with alternatives to the undertaking; alternative methods of carrying out the undertaking and finally a discussion of the comments of the study participants on the recommended alternative.

4.1 ALTERNATIVES TO THE UNDERTAKING

Several alternatives to the undertaking were identified during the course of the studies within the Queen Elizabeth Way corridor. These have been categorized as follows:

- Do nothing
- Localized geometric improvements
- Traffic operation improvements
- Increase vehicle occupancy rates (including transit)
- Improvements to local road system
- Additions to Provincial Highway System
- Combination of alternatives
- Widen existing Queen Elizabeth Way (the undertaking)

The analysis of these alternatives was carried out to enable an evaluation to be made of the advantages and disadvantages of each one. This analysis included making an assessment of how well the alternative resolved the problems within the corridor as well as making an assessment of the effects on the social environment and the natural environment.

Some of the alternatives that were identified during the course of the study did not solve the identified deficiencies and consequently they were eliminated early in the study process. Obviously, the inability of some alternatives to meet the purpose of the undertaking can be identified without extensive examination. The more eligible an alternative is, the more detailed the comparison. This is reflected in the length of the discussion documented for each of the identified alternatives in this report.

4.1.1 Do Nothing

The 'Do Nothing' alternative would entail making no changes to the Queen Elizabeth Way corridor beyond those that are associated with the approved Stage 1 redevelopment.

With respect to the effects on the problems that have been identified within the corridor, this alternative would:

- Result in a continuation of the slow downs and stoppages and attendant loss of time and fuel consumption to commuter, long distance and truck traffic that occurs within the corridor at the present time. In addition, the frequency of slow downs and stoppages would increase as traffic volumes increase in the future. These slow downs have been estimated to result in an additional user cost of approximately $90 million in comparison to the proposed undertaking. (An explanation of how user costs have been calculated is given in section 4.2.4).

  Slow downs and stoppages can generally be anticipated when a roadway is operating at level of service 'E' as defined in section 3.3.7. For comparison purposes, the hours of operation, per day, for each alternative to the undertaking have been calculated for the year 1990 (the method of calculation is discussed in section 1.3). For the Do Nothing alternative it is estimated that the roadway will operate at level of service E. or worse, for 4.9 hours per day by 1990.

- Result in a continuation of high accident rates within the corridor. These are presently at approximately twice the Provincial freeway average on the Skyway section and 1.6 times the Provincial freeway average on the remaining portion. In addition, the accident rate is anticipated to increase as traffic volumes increase in the future.

- Result in further deterioration of the existing Skyway which even now requires closing for approximately 6 months in order to permit the necessary maintenance (deck and railing replacement) to take place. This closure of the Skyway would require the freeway traffic to be accommodated on other roadways causing extensive congestion, noise and loss of time and energy on these roadways. During this closure, approximately 7,000,000 vehicle trips would be diverted.

- Result in no flexibility to handle future traffic requirements. With the implementation of this alternative, a further capacity improvement would have theoretically been required by 1978. This is over and above the Stage 1 redevelopment.

With respect to the effects on the social environment, this alternative would:

- Result in a constraint to the orderly development of the local municipalities in accordance with their Official Plans. This concern has been expressed by the affected area and regional municipalities.

- Result in no change to land use within the corridor.

- Result in no change to the community within the corridor.

- Result in minor noise level increases as traffic volumes increase within the corridor.

- Result in no change to heritage resources within the corridor.

- Result in no change to the aesthetics of the corridor.

- Result in the continued deterioration of the existing constraints to mobility and accessibility for industry, trade and commerce within the study area.

- Result in no change to agriculture within the study area.

With respect to the effects on the natural environment, this alternative would:

- Result in no change to water resources within the corridor.

- Result in increased air pollutant emissions as slow downs and stoppages become more frequent in the future.

- Result in no change to vegetation resources within the corridor.

- Result in no change to wildlife within the corridor.

- Result in no change to any identified Environmentally Sensitive Areas within the corridor.

There would be no capital construction costs associated with the "Do Nothing" alternative.

This alternative would have no positive effects and therefore its advantages have been identified in terms of factors on which there would be no undesirable condition changes. This applies to the following:

o	Land Use	– No change
o	Community	– No change
o	Heritage Resources	– No change
o	Aesthetics	– No change
o	Agriculture	– No change
o	Water	– No change
o	Vegetation	– No change
o	Wildlife	– No change
o	Environmentally Sensitive Areas	– No change
o	Capital Construction Cost	– No cost

The disadvantages of this alternative can be summarized as follows:

- Slow downs and stoppages – Continuation of existing
- Accident rates – Continuation of high rates
- Skyway maintenance – Q.E.W. closure required
- Future traffic – No flexibility
- Official Plans – Constraint to development
- Noise – Increased levels
- Industry, trade and commerce – Continued constraint
- Air – Increased emissions

In comparison to the major disadvantages associated with permitting the existing problems to continue within the Queen Elizabeth Way corridor, the advantages were not considered to be significant. Therefore, this alternative was not considered an acceptable alternative.

4.1.2 Localized Geometric Improvements

This alternative would entail making localised geometric improvements to increase the capacity of the roadway. The Government Review of the 1979 submission to the Ministry of Environment indicated that capacity improvements could theoretically be made to the Queen Elizabeth Way corridor by varying roadway conditions that include the following:

Grades
Width of Lanes
Lateral Clearance
Design Speeds
Configuration of Lanes
Curvature

In reality, the existing geometrics on the Queen Elizabeth Way are such that capacity improvements are not possible by altering any of these parameters. This is discussed below.

Grades

The only limiting grades on the Queen Elizabeth Way between Burlington and Hamilton at the present time are on the Burlington Skyway. Any adjustment of this grade would entail the replacement of the Skyway. In addition, grade changes at the Canal Crossing would imply either a lowering of the clearance over the Canal which is not feasible to maintain Hamilton as an ocean going port, or a lengthening of the Skyway structure with the associated economic and social impact. Therefore, this option was not considered to be a viable alternative.

Width of Lanes

Capacity calculations for roadways are based on a technique documented within the Highway Capacity Manual that is produced by the Highway Research Board.

The Highway Capacity Manual indicates that lane widths of 3.65 m (12') will result in no reduction of roadway capacity whereas widths of less than 3.65 m will. The width of the lanes on the Queen Elizabeth Way between Burlington and Hamilton is 3.65 m and therefore there is no theoretical possibility to increase the highway capacity by varying lane widths.

Lateral Clearance

The Highway Capacity Manual indicates that no reduction in roadway capacity occurs provided that lateral obstructions are more than 1.8 m (6') from the edge of the travelled lanes. The Manual also indicates that clearances of less than 1.8 m can be tolerated without a reduction in capacity if the obstruction continues over a long distance such as on the Burlington Skyway, rather than being an isolated obstacle.

The conditions on the Queen Elizabeth Way between Burlington and Hamilton are such that changes to lateral clearances would not increase the theoretical breakdown capacity of the freeway.

Design Speeds

Design speeds of freeways do not affect the theoretical breakdown capacity although they do have some affect on operational speeds under free flow conditions. Therefore, this option was not considered to be a viable alternative.

Configuration of Lanes

The configuration of lanes on a freeway is recognized as affecting its safe operation (a poor configuration can lead to accidents), but it does not play any part in the determination of the theoretical breakdown capacity of the roadway, provided that adequate weaving and merging sections are employed.

Curvature

Curvature does not affect the capacity of a roadway unless curves are provided that are well below the design standards associated with the design speed of the roadway. There are no curves on this section of highway that are so substandard that an improvement in them would increase the roadway capacity.

In summary, there are no localized geometric improvements that can be made within this section of the Queen Elizabeth Way to increase the capacity and therefore it was not considered necessary to discuss the advantages and disadvantages of doing so.

4.1.3 Traffic Operation Improvements

This alternative would entail the implementation of a number of traffic management techniques in an attempt to improve the flow of traffic within the Queen Elizabeth Way corridor. In assessing this alternative it was recognized that a number of traffic management techniques are being incorporated within the approved Stage 1 redevelopment of the Queen Elizabeth Way. These include variable message signs, advance warning techniques and incident detection techniques. The consideration of traffic operation improvements as part of this Environmental Assessment has therefore only dealt with additional techniques that might be considered over and above the Stage 1 improvements. Traffic operation improvements that have been identified for consideration as alternatives to the widening of the Queen Elizabeth Way include the following:

Ramp metering
Truck Restrictions
Staggered hours

In reality, these various options would have an imperceptible effect in solving any of the existing problems within the corridor. This is discussed below:

Ramp Metering

The purpose of ramp metering is to regulate the number of vehicles entering a facility during congested periods. This avoids surges of traffic entering the freeway and facilitates the free flow of traffic on the through lanes.

The implementation of ramp metering provides for improved operation on a facility but does not result in increased capacity.

Truck Restrictions

The purpose of this technique is to restrict trucking in peak hours in order to free up existing capacity for use by autos which then operate under less congested conditions. This technique would improve operation of the Skyway during weekday peak hours but would transfer the problem to the arterial across the Beach Strip and in particular to the lift bridge over the Canal. This technique fails to recognize the importance of trucking to the provincial economy and is contrary to the Ministry of Transportation and Communications' "quantity and quality standards for King's Highway Service" which allow for the free movement of all vehicles on King's Highways at all times.

Staggered Hours

The effect of flexible and staggered hours is the spreading of start and ending times for the work day to provide relief to the peak weekday morning and evening hours, and to spread the normal peak hour travel into the adjacent hours. This also allows some spreading of the non-work travel. In the case of the compressed work week the objective is to compress the normal work week into 4 or less days, thus eliminating several work trips per week. This can have a major alleviating impact on both the work and non-work traffic peaking characteristics.

The two techniques tend to level out the peak hours and get better use of a facility. Many companies are already working to some form of altered work schedule and this has probably contributed to peak spreading on the Skyway which has spread from a one hour peak in 1972 to almost 3 hours in 1981.

The Ministry of Transportation and Communications through the Transportation Energy Management Program (T.E.M.P.) is presently conducting a study of alternative work schedules, in order to assess the transportation, energy and social effects of large scale changes in the traditional 9 to 5, five day a week, work pattern.

If this study finds them to be beneficial from both the social and transportation points of view, and they are accepted by local labour and employers, it will be a number of years before they are implemented in a major way. It should be noted that the Ministry of Transportation and Communications has no control over the implementation of alternative work schedules but can only act to promote them.

In summary, "traffic operation improvements" such as ramp metering would facilitate the more orderly movement of traffic and therefore have some very minor effects on slow downs and stoppages but would not improve the theoretical capacity of the corridor. Traffic operation improvements such as truck restrictions or staggered hours could reduce the volume of traffic during peak periods but as stated previously would not be feasible to implement.

With respect to the effects of this alternative, it would result in such an imperceptible reduction in the frequency of slow downs and stoppages that the condition changes brought about by this alternative would also be imperceptible.

4.1.4 Increase Vehicle Occupancy Rates (Including Transit)

This alternative would entail the implementation of a number of techniques to reduce the number of vehicles within the corridor. Higher vehicle occupancy rates can be achieved by the use of the following:

Car and Van Pooling
Transit
High Occupancy Vehicle Lanes

In reality, these various options would have a very minor effect in reducing the number of vehicles within the corridor. This is discussed below:

Car and Van Pooling

The Ministry of Transportation and Communications through the Transportation Energy Management Program (T.E.M.P) has for some time been actively pursuing the promotion of car and van pooling, the focus being on the establishment of car pooling and the promotion of the concept of company sponsored van pooling. The program is aimed at large employers who will set up car pool matching programs, or who will voluntarily purchase and operate vans for their employees. The program is marketed by means of presentations and technical assistance being provided by the Ministry of Transportation and Communications to large employers.

A major initiative presently under study by the Ministry of Transportation and Communications is the implementation of a pilot project for an area wide ride-sharing information service. This proposal would cover all Regions in Central Ontario from Hamilton-Wentworth to Durham. In this program, persons wishing to form car pools would register their home and work addresses with a central agency and would receive a list of all other interested persons with similar journey to work patterns.

To supplement van and car pool operations, the Ministry of Transportation and Communications is installing commuter parking lots along major roads.

It is of note that some informal pooling takes place at the present time. A 1976 survey determined that car pools were in existence for work trips within the corridor and that an average auto occupancy rate for work trips was 1.22 at that time.

Transit

The Regional Official Plans for Halton and Hamilton Wentworth encourage the expansion of inter-regional transit. In 1978 the Ministry of Transportation and Communications published a report "Inter Regional Bus Transit Study - Oakville to Hamilton" which recommended an improved transit service between Oakville, Burlington and Hamilton.

In assessing the Queen Elizabeth Way corridor the Ministry of Transportation and Communications' analysis indicates that the existing modal split within the corridor (proportion of people using transit) is approximately 3% and that this is expected to increase to 5% by the year 2001. These transit riderships do not represent a significant component of the total volume of traffic within the Queen Elizabeth Way corridor.

High Occupancy Vehicle Lanes

This technique designates one lane of a multi-lane freeway for use by High Occupancy Vehicles (HOV's), e.g. autos having 3 or more persons, and transit vehicles. This encourages high occupancy rates by rewarding drivers with a faster flowing lane to travel in. While this technique has been applied successfully in the USA, and has resulted in increasing vehicle occupancy, it is not applicable to the existing Skyway situation where one lane is already designated as a truck lane. A contraflow High Occupancy Vehicle lane could not be considered due to fairly high traffic volumes in the off peak direction, and because only one lane would be left to service that traffic.

American experience has shown that HOV lanes are most successful when implemented in advance of congestion, or at a time when additional lanes are being added to a facility. The Ministry of Transportation and Communications, through the Transportation Energy Management Program (T.E.M.P) has developed guidelines for the implementation of HOV lanes throughout the Province. Provincial facilities including the Skyway will be subject to further investigation on the basis of these guidelines. This investigation will be carried out prior to or concurrently with the implementation of the Stage 2 improvements.

All of the high occupancy vehicle techniques that have been discussed are only functional when trips have similar routine starting times and similar origins and destinations. These characteristics only apply to commuter traffic rather than to tourist, recreational or truck traffic. With the various techniques that are available, and recognizing the different types of traffic within the corridor, the Ministry of Transportation and Communications has estimated that a maximum reduction of 6% in traffic volumes could be achieved if all of the possible high vehicle occupancy techniques were to be implemented and were found to be successful. The effects of implementing these schemes and achieving a 6% reduction in traffic volumes is discussed below:

With respect to the effects on the problems that have been identified within the corridor, this alternative would:

o Result in a continuation of the slow downs and stoppages and attendant loss of time and fuel consumption to commuter, long distance and truck traffic that occurs within the corridor at the present time. These slow downs and stoppages will continue to occur even with a 6% reduction in traffic volumes because the volumes would still be in excess of the capacity of the corridor. Although there would be a continuation of slow downs and stoppages within the corridor, the 6% reduction in traffic would result in some very minor reduction in the frequency of these slow downs and stoppages.

  This alternative has been estimated to operate at level of service 'E', or worse, for 3.9 hours per day by 1990.

o Result in a continuation of high accident rates within the corridor. These are presently at approximately twice the Provincial freeway average. These high accident rates will continue to occur even with a 6% reduction in traffic volumes although there would be some very minor reduction due to this traffic decrease.

o Result in further deterioration of the existing Skyway which even now requires closing for approximately 6 months in order to permit the necessary maintenance (deck and railing replacement) to take place. This closure of the Skyway would require the freeway traffic to be accommodated on other roadways causing extensive congestion, noise and loss of time and energy on these roadways. During this closure, approximately 7,000,000 vehicle trips would be diverted.

- Result in no flexibility to handle future traffic requirements. With the implementation of this alternative and assuming a full 6% removal of traffic from the corridor, a further capacity improvement would have theoretically been required by 1980. This is over and above the Stage 1 redevelopment.

With respect to the effects on the social environment, this alternative would:

- Result in a constraint to the orderly development of the local municipalities in accordance with their Official Plans. The Official Plans of the affected municipalities do in fact call for increased transit development, however, this is proposed in conjunction with providing increased capacity in the Queen Elizabeth Way corridor, rather than being considered as an alternative.

- Result in no change to land use within the corridor.

- Result in no change to the community within the corridor.

- Result in minor noise level increases as traffic volumes increase within the corridor.

- Result in no change to heritage resources within the corridor.

- Result in no change to the aesthetics of the corridor.

- Result in the continued deterioration of the existing constraints to mobility and accessibility for industry, trade and commerce within the study area.

- Result in no change to agriculture within the study area.

With respect to the effects on the natural environment, this alternative would:

- Result in no change to water resources within the corridor.

- Result in increased air pollutant emissions as slow downs and stoppages become more frequent in the future.

- Result in no change to vegetation resources within the corridor.

- Result in no change to wildlife within the corridor.

- Result in no change to any identified Environmentally Sensitive Areas within the corridor.

The capital construction costs associated with this scheme have not been estimated as they could be extremely variable depending on the level of service provided. Car pooling techniques could be implemented for virtually no cost whereas an extensive transit service could cost tens of millions of dollars.

The advantages of this alternative have been identified in terms of factors on which there would be no undesirable condition changes. This applies to the following:

- Land Use – No change
- Community – No change
- Heritage Resources – No change
- Aesthetics – No change
- Agriculture – No change
- Water – No change
- Vegetation – No change
- Wildlife – No change
- Environmentally Sensitive Areas – No change

The disadvantages of this alternative can be summarized as follows:

o Slow downs and stoppages	- Continuation of existing
o Accident rates	- Continuation of high rates
o Skyway maintenance	- Q.E.W. closure required
o Future traffic	- No flexibility
o Official Plans	- Constraint to development
o Noise	- Increased levels
o Industry, trade and commerce	- Continued constraint
o Air	- Increased emissions
o Capital construction cost	- Not estimated

In comparison to the major disadvantages associated with permitting the existing problems to continue within the Queen Elizabeth Way corridor, the advantages were not considered to be significant. Therefore, this alternative was not identified as the preferred one.

4.1.5 Improvements to Local Road System

This alternative entails the consideration of proposed roadways that would be under municipal jurisdiction. In particular three proposals of the Region of Hamilton-Wentworth were considered. These were:

- North-South Transportation Corridor
- East-West Transportation Corridor
- Industrial Perimeter Road

The location of these proposed roadways is shown in figure 8. The total length of these three roadways would be approximately 20 km. None of these three roadways is presently scheduled for construction and both the North-South and East-West Transportation Corridors are in fact the subject of a separate Environmental Assessment that is being prepared by the Region of Hamilton-Wentworth at the present time.

The effects of constructing these roadways would occur both within the Queen Elizabeth Way corridor and within the vicinity of the alternative roadways. Within the Queen Elizabeth Way corridor the effects of the alternatives can be related to the diversion of traffic. Section 3.3.6 of this report includes traffic assignments to the Queen Elizabeth Way for various network assumptions. If both the North-South Transportation Corridor and the East-West Transportation Corridor were constructed they would divert approximately 12% of the Queen Elizabeth Way traffic. If the North-South Transportation Corridor, the East-West Transportation Corridor and the Industrial Perimeter Road were constructed, they would divert approximately 18% of the Queen Elizabeth Way traffic. As indicated previously, there is no specific schedule for construction of these roadways but in order to provide some understanding the earliest date by when they could possibly be in operation it has been estimated that the North-South and East-West Transportation Corridors could not be totally operational prior to the early 1990's and the Industrial Perimeter Road would not likely to be operational until the late 1990's.

With respect to the effects on the problems that have been identified within the corridor, the diversion of 18% traffic would:

- Result in a reduction of the frequency of slow downs and stoppages and attendant loss of time and fuel consumption to commuter, long distance and truck traffic that occurs within the corridor at the present time.

  This alternative has been estimated, to operate at level of service 'E', or worse, for 2.1 hours per day by 1990.

- Result in a minor reduction of the existing high accident rates within the corridor.

- Result in further deterioration of the existing Skyway which even now requires closing for approximately 6 months in order to permit the necessary maintenance (deck and railing replacement) to take place. This closure of the Skyway would require the freeway traffic to be accommodated on other roadways causing extensive congestion, noise and loss of time and energy on these roadways. During this closure, approximately 7,000,000 vehicle trips would be diverted.

ALTERNATIVES AND EVALUATION

- Result in minor flexibility to handle future traffic requirements. With the implementation of this alternative and assuming a full 18% diversion of traffic from the corridor, a further capacity improvement would be required by approximately 1987 which is well before these alternative roadways could in fact be operational.

With respect to the effects on the social and natural environment this alternative would:

- Result in a constraint to the orderly development of the local municipalities in accordance with their Official Plans. The Official Plans of the affected municipalities do in fact call for the development of the North-South and East-West Transportation Corridors as well as the Industrial Perimeter Road, however, these are proposed in conjunction with providing increased capacity in the Queen Elizabeth Way Corridor, rather than being considered as an alternative.

- Result in no change to land use, community, heritage resources, aesthetics, agriculture, water, vegetation, wildlife, and environmentally sensitive areas within the Queen Elizabeth Way corridor. Within the vicinity of the alternative roadways there would however be significant changes in terms of these factors due to the urbanized character of the lands through which the roadways would be constructed. These effects have not been assessed as part of this study.

- Result in noise level decreases initially due to reductions in traffic volumes within the corridor and noise level increases as future traffic volumes increase within the Queen Elizabeth Way corridor. Within the vicinity of the alternative roadways it is probable that there would be noise level increases due to the construction of the new roadways.

- Result in the continued deterioration (with only temporary relief) of the existing constraints to mobility and accessibility for industry, trade and commerce within the study area.

- Result in reduced air pollutant emissions as slow downs and stoppages are initially reduced due to the diversion of traffic and increased emissions as future traffic volumes increase within the Queen Elizabeth Way corridor. Within the vicinity of the alternative roadways it is probable that there would be increases in air pollutant emissions due to the construction of the new roadways.

The capital construction costs associated with this alternative would be in the order of $170 million.

The advantages of this alternative relate to a reduction of traffic within the corridor which in turn has the following effects:

o Slow downs and stoppages	–	some reduction
o Accident rates	–	some reduction
o Future traffic	–	some flexibility (additional capacity required by 1987±)

The disadvantages of this alternative relate both to the Queen Elizabeth Way corridor and the corridors within which the alternative roadways would be constructed. These can be summarized as follows:

o Skyway maintenance	–	QEW closure required
o Official Plans	–	constraint to development
o Land Use	–	*
o Community	–	*
o Noise	–	*
o Heritage Resources	–	*
o Aesthetics	–	*
o Industry, Trade & Commerce	–	*
o Agriculture	–	*
o Water	–	*
o Air	–	*
o Vegetation	–	*
o Wildlife	–	*

o Environmentally Sensitive Areas	-	*
o Capital Construction Cost	-	$170 million ±

* The net effects within both the Queen Elizabeth Way corridor and the alternative roadway corridors have not been detailed as part of this study but they are anticipated to be significant.

The advantages in terms of the improvements to the existing problems within the Queen Elizabeth Way corridor were considered to be so limited as to not warrant the disadvantages associated with this alternative.

On this basis this alternative was not identified as the preferred one to resolve problems within the Queen Elizabeth Way corridor.

4.1.6 Additions to Provincial Highway System

This alternative would entail the construction of a new provincial highway. In particular, during the 1972/74 study of the Queen Elizabeth Way, there had been a discussion of the possibility of providing an additional freeway in the highway network in order to relieve the need to widen the Queen Elizabeth Way. This additional freeway would extend from Highway 403 east of Burlington to east of Hamilton.

A very brief assessment of the alternative indicated that it would need to be approximately 50 km long, would require approximately 500 ha of land in a predominantly rural area, would need either 2 or 4 crossings of the Niagara escarpment (depending on the actual alignment), would cost approximately $200 million to construct and would divert only 5%-10% of traffic from the Queen Elizabeth Way corridor.

At the time of the 1972/74 study it was assessed that the 5%-10% reduction in traffic volumes within the Queen Elizabeth Way corridor would neither negate the need to provide additional capacity in the Queen Elizabeth Way corridor nor warrant the costs and impacts associated with construction of the new freeway.

During the preparation of this present Environmental Assessment report it was concluded that this assessment was still valid and therefore no detailed documentation of advantages and disadvantages was carried out.

4.1.7 Combination of Alternatives

This alternative entails the consideration of a combination of the alternatives that have been discussed previously.

Specifically:

- Do nothing
- Localized geometric improvements
- Traffic operation improvements
- Increase vehicle occupancy rates
- Improvements to local road system
- Addition to Provincial Highway system

The "Do Nothing" alternative would result in a worsening of the existing conditions and by definition can not be considered in combination with the others. The effects and associated advantages and disadvantages of the "Do Nothing" alternative are discussed in section 4.1.1.

There are no "Localised geometric improvements" that can be made to offset the identified problems.

The "Traffic operation improvements" and "Increase vehicle occupancy rates" alternatives can be considered in combination. The effects and the associated advantages and disadvantages of the two alternatives when combined will be virtually the same as those identified in section 4.1.4 (Increase vehicle occupancy rates).

The "Improvements to local road system" and "Additions to Provincial Highway system" alternatives would be mutually exclusive from a Provincial viewpoint as both would provide a south-westerly bypass to the City of Hamilton. For this reason, only one of these two alternatives has been considered in combination with the other alternatives. As indicated in section 4.1.6, the "additions to Provincial Highway system" alternative was not considered to be a viable alternative and therefore the "Improvements to local road system" alternative is the one that has been considered for an assessment of the combined effects of various alternatives.

The possible combination of alternatives therefore provides for an assessment of the following:

- o Traffic operation improvements, plus
- o Increase vehicle occupancy rates, plus
- o Improvements to local road system

A combination of these alternatives could result in the removal or diversion of 20%-25% of the traffic from the Queen Elizabeth Way corridor.

With respect to the effects on the problems that have been identified within the corridor, the diversion of 20%-25% traffic would:

- o Result in a reduction of the frequency of slow downs and stoppages and attendant loss of time and fuel consumption to commuter, long distance and truck traffic that occurs within the corridor at the present time.

  This alternative has been estimated to operate at level of service 'E', or worse, for 1.7 hours per day by 1990.

- o Result in a minor reduction of the existing high accident rates within the corridor.

- o Result in further deterioration of the existing Skyway which even now requires closing for approximately 6 months in order to permit the necessary maintenance (deck and railing replacement) to take place. This closure of the Skyway would require the freeway traffic to be accommodated on other roadways causing extensive congestion noise and loss of time and energy on these roadways. During this closure, approximately 7,000,000 vehicle trips would be diverted.

- o Result in minor flexibility to handle future traffic requirements. With the implementation of this alternative and assuming a 20%-25% diversion of traffic from the corridor, a further capacity improvement would be required by approximately 1990. This is illustrated in figure 13.

With respect to the effects on the social and natural environment this alternative would:

- o Result in a constraint to the orderly development of the local municipalities in accordance with their Official Plans. The Official Plans of the affected municipalities do in fact call for the development of improved transit and for the construction of the North-South and Eat-West Transportation Corridors as well as the Industrial Perimeter Road, however, these are proposed in conjunction with providing increased capacity in the Queen Elizabeth Way corridor, rather than being considered as an alternative.

- o Result in no change to land use, community, heritage resources, aesthetics, agriculture, water, vegetation, wildlife and environmentally sensitive areas within the Queen Elizabeth Way corridor. Within the vicinity of the alternative roadways there would however be significant changes in terms of these factors due to the urbanized character of the lands through which the roadways would be constructed. These effects have not been assessed as part of this study.

- o Result in noise level decreases initially due to reduction in traffic volumes within the corridor and noise level increases as future traffic volumes increase within the Queen Elizabeth Way corridor. Within the vicinity of the alternative roadways it is probable that there would be noise level increases due to the construction of the new roadways.

- o Result in the continued deterioration (with only temporary relief of the existing constraints to mobility and accessibility for industry, trade and commerce within the study area.

- Result in reduced air pollutant emissions as slow downs and stoppages are initially reduced due to the diversion of traffic and increased emissions as future traffic volumes increase within the Queen Elizabeth Way corridor. Within the vicinity of the alternative roadways it is probable that there would be increases in air pollutant emissions due to the construction of the new roadways.

The capital construction costs associated with this alternative would be in excess of $170 million.

The advantages of this alternative relate to a reduction of traffic within the corridor which in turn has the following effects:

- Slow downs and stoppages - some reduction
- Accident rates - some reduction
- Future traffic - some flexibility (additional capacity required by 1990 ±)

The disadvantages of this alternative relate both to the Queen Elizabeth Way corridor and the corridors within which the alternative roadways would be constructed. These can be summarized as follows:

- Skyway maintenance - QEW closure required
- Official Plans - constraint to development
- Land Use - *
- Community - *
- Noise - *
- Heritage Resources - *
- Aesthetics - *
- Industry, Trade & Commerce - *
- Agriculture - *
- Water - *
- Air - *
- Vegetation - *
- Wildlife - *
- Environmentally Sensitive Areas - *
- Capital Construction Cost - $200 million

* The net effects within both the Queen Elizabeth Way corridor and the alternative roadway corridors have not been detailed as part of this study but they are anticipated to be significant.

The advantages in terms of the limited improvements to the existing problems within the Queen Elizabeth Way corridor were considered to be so limited as to not warrant the disadvantages associated with this alternative.

On this basis this combination of alternative was not identified as the preferred one to resolve problems within the Queen Elizabeth Way corridor.

4.1.8 Widen Existing Queen Elizabeth Way (The Undertaking)

This alternative will entail the reconstruction of the Queen Elizabeth Way to provide three lanes in each direction plus a truck climbing lane at the Burlington Canal Crossing. In carrying out this reconstruction, provision will be made to add one additional lane in each direction at some time in the future. In addition provision will be made for the construction/reconstruction of interchanges within the corridor.

The additional lanes provided on the Queen Elizabeth Way in Stage 2 will provide for an increase of 50% in the capacity of the freeway on the approaches to the Canal crossing and an increase of 100% in the existing capacity of the Skyway.

With respect to the effects on the problems that have been identified within the corridor, the increased capacity would:

- Result in the elimination of slow downs and stoppages and attendant loss of time and fuel consumption to commuter, long distance and truck traffic that occurs within the corridor at the present time. A long term discounted saving of $88.5 million in time and fuel costs.

- Result in a major reduction of the existing high accident rates from approximately twice the Provincial average for freeways on the Skyway and 1.6 times the Provincial average on the remaining section to the Provincial average i.e. an initial reduction of approximately 160 accidents per year.

- Permit the maintenance (deck and railing replacement) that is presently required on the Skyway to take place as part of the reconstruction that will be required to make the existing Skyway operate as a one way structure. The existing freeway traffic will be diverted to the new Canal crossing while this work is being carried out.

- Result in the flexibility to handle future traffic requirements. With the additional capacity that will be provided within the corridor, a further capacity improvement will not be required until after the year 2001. In addition the provision to add one additional lane in each direction would provide further flexibility in the future.

With respect to the effects on the social environment this alternative would:

- Remove a constraint to the orderly development of the local municipalities in accordance with their Official Plans.

- Result in no change to land use within the corridor except for minor requirements for Highway widening. See section 5.2.1.

- Result in the need to acquire 20 homes from the community along the Beach Strip. See section 5.2.2.

- Result in overall noise reductions within the corridor. See section 5.2.3.

- Result in the removal of homes and vegetation within the corridor although no unique heritage resources will be removed. See sections 5.2.4 and 5.2.5.

- Result in a change to the aesthetics in the corridor as a result of removing some vegetation, adding noise barriers and landscaping and twinning the existing Skyway. The net effect is identified as neither an advantage nor a disadvantage. See section 5.2.6.

- Result in improved accessibility and reduced transportation costs and time losses for industry, trade and commerce. See section 5.3.6.

- Result in no changes to agriculture within the study corridor although the Ministry of Agriculture and Food has expressed the opinion that increased capacity in this corridor could result in long term pressures for land use changes within the Niagara Peninsula. See section 5.2.7.

With respect to the effects on the natural environment, this alternative would:

- Result in minor changes to water resources within the corridor. In particular the Canal crossing will require the filling of approximately 0.5 ha of the Hamilton Harbour, over and above that required in Stage 1, and the Stage 3 redevelopment of the freeway will require three new structures over the Red Hill Creek. See section 5.2.8.

- Result in improved air pollution levels due to the reduction of slow downs and stoppages within the traffic stream. See section 5.2.9.

- Result in the removal of approximately 1.5 ha of vegetation within the corridor. None of this has been identified as being of high quality. See section 5.2.10.

- Result in some limited removal of potential wildlife habitat for birds and reptiles (0.3 ha) in the vicinity of the Red Hill Creek marsh during the Stage 3 redevelopment of the Queen Elizabeth Way. See section 5.2.11.

- Result in the filling of 0.3 ha of the Red Hill Creek Marsh-Van Wagner's Marsh Environmentally Sensitive Area during the Stage 3 redevelopment of the Queen Elizabeth Way. See section 5.2.12.

The capital construction cost associated with this alternative would be $48.5 million.

The advantages of this alternative are directly related to the provision of additional roadway capacity in the corridor. These advantages can be summarized as follows:

- Slow downs and stoppages - virtual elimination
- Accident rates - reduced to Provincial average
- Skyway maintenance - included in construction
- Future traffic - can be accommodated
- Official Plans - constraint to development removed
- Land use - no change
- Noise - Levels reduced
- Industry, Trade & Commerce - stimulated by proposal
- Agriculture - no change
- Air - emissions reduced

The disadvantages of this alternative can be summarized as follows:

- Community - 20 homes acquired
- Heritage Resources - homes removed
- Water - harbour fill (0.5 ha)
- Vegetation - trees removed (1.5 ha)
- Wildlife - habitat removal (0.3 ha)
- Environmentally Sensitive Areas - 0.3 ha fill in Red Hill Creek Marsh
- Capital Construction Cost - $48.5 million

The advantages associated with this alternative were considered to be far more significant than the disadvantages and consequently this alternative was identified as the preferred one.

4.1.9 Summary

The alternatives to the undertaking were all assessed in terms of their effects on transportation, the social environment and the natural environment. These effects are summarized on pages 82 and 83.

The non-roadway alternatives to the widening of the Queen Elizabeth Way, (do nothing, localized geometric improvements, traffic operation improvements and increased vehicle occupancy rates) had less effect on the overall natural and social environment (excluding the effects on Official Plans, noise and air) than the proposed undertaking. However, these alternatives provided only very minor improvements to the identified problems within the corridor and the residual problems that would remain with these alternatives were considered to be so severe that they outweighed the disadvantages associated with widening the Queen Elizabeth Way.

The roadway alternatives to the widening of the Queen Elizabeth Way (improvements to local road system and additions to Provincial Highway System), or a combination of these with the non-roadway alternatives, would in part reduce the severity of the problem within the Queen Elizabeth Way corridor but would have greater overall social and natural environmental effects than the widening of the Queen Elizabeth Way. As the Queen Elizabeth Way widening would completely resolve the problems within the existing corridor, it was preferred to the other roadway alternatives.

On this basis the preferred alternative was identified as being the widening of the Queen Elizabeth Way.

4.2 ALTERNATIVE METHODS OF CARRYING OUT THE UNDERTAKING

The alternative methods of carrying out the undertaking were reviewed in terms of the following basic elements:

Cross section
Alignment
Grade
Burlington Canal Crossing

These elements were analyzed and evaluated in different fashions during the 1972/74 study, the 1978/79 study and the 1981 reassessment of the 1979 Environmental Assessment submission to the Ministry of Environment.

During the 1972/74 study, the analysis of the alternative methods of widening the Queen Elizabeth Way was carried out for nine factors. These were as follows:

Traffic Service
Flexibility
Costs
Property
Communities
Noise, Air and Water
Wildlife and Unique Areas
Aesthetics
Safety

Traffic Service was analyzed on the basis of the "Level of Service" that would be afforded by each of the alternatives. This was discussed in detail in section 3.3.7.

Flexibility was analyzed on the basis of a subjective assessment as to the ability to stage construction of the alternatives, to meet future needs.

Costs were analyzed on the basis of estimated construction costs as of 1973. These costs included all materials and labour as well as allowing for contingencies and engineering costs.

Property was analyzed on the basis of (1) the number of acres of land that would have to be acquired, (2) the number of acres of surplus property that could be disposed of following construction of the highway and (3) the number of houses that would have to be acquired.

Community impacts were analyzed subjectively and reflected a combination of the impacts due to removing homes, severences of land that were in agricultural use at the time of the 1972/74 study and the proximity of the highway to the various communities within the corridor.

Noise, air and water impacts were analyzed quantitatively for noise and subjectively for air and water impacts.

Wildlife and Unique Areas were analyzed subjectively based on the environmental inventory documented in Appendix F.

Aesthetics were analyzed subjectively based on the appearance of the highway to the adjacent residents.

Safety was analyzed on the basis of an assessment of anticipated accident rates and on the basis of a subjective assessment of the benefits associated with a tunnel in comparison to a bridge at the Burlington Canal.

During the 1978/79 study a detailed analysis of arterial routes was carried out using similar but not identical factors to those considered for the Queen Elizabeth Way alternatives in the 1972/74 study. This analysis of arterial routes resulted in the recommendations that have been approved for the Stage 1 redevelopment of the Queen Elizabeth Way.

During the 1981 reassessment of the 1979 submission a detailed analysis was carried out on the Burlington Canal Crossing. This is discussed in more detail later in section 4.2.4.

ALTERNATIVES AND EVALUATION

	ALTERNATIVES TO THE UNDERTAKING							
	DO NOTHING	LOCALIZED GEOMETRIC IMPROVEMENTS	TRAFFIC OPERATION IMPROVEMENTS	INCREASE VEHICLE OCCUPANCY RATES	IMPROVEMENTS TO LOCAL ROAD SYSTEM	IMPROVEMENTS TO PROVINCIAL HIGHWAY SYSTEM	COMBINATION OF ALTERNATIVES	WIDEN Q.E.W. (THE UNDERTAKING)
EFFECTS ON TRANSPORTATION								
• **LEVEL OF SERVICE** (HOURS OF OPERATION, PER DAY IN 1980, AT LEVEL OF SERVICE 'E' - CAUSING SLOW DOWNS AND STOPPAGES FOR COMMUTER, LONG DISTANCE AND TRUCK TRAFFIC)	4.9 hours continuation of existing slow downs and stoppages	4.9 hours continuation of existing slow downs and stoppages	4.9 hours imperceptible reduction in frequency of slow downs and stoppages	3.9 hours minor reduction in frequency of slow downs and stoppages due to reduction of up to 6% in traffic volumes	2.1 hours - moderate reduction in frequency of slow downs and stoppages due to diversion of up to 18% of traffic volumes to N-S & E-W Transportation Corridors and Industrial Perimeter Road	3.8 hours minor reduction in frequency of slow downs and stoppages due to diversion of 5-10% of traffic volumes to new freeway around Burlington and Hamilton	1.7 hours moderate reduction in frequency of slow downs and stoppages due to reduction or diversion of 20-25% of traffic to a combination of all alternatives except widening of QEW	0 hours - elimination of slow downs and stoppages due to 50% increase in capacity of roadway on approaches to Canal and 100% increase in capacity at the Canal.
• **ACCIDENT RATES**	Continuation of existing high accident rate - twice Provincial freeway average	Continuation of existing high accident rate - twice Provincial freeway average	Imperceptible reduction of existing high accident rate - twice Provincial freeway average	Very minor reduction of existing high accident rate	Minor reduction of existing high accident rate	Very minor reduction of existing high accident rate	Minor reduction of existing high accident rate	Major reduction of accident rate by 50% to equal the Provincial freeway average.
• **MAINTENANCE OF EXISTING SKYWAY** (BRIDGE DECK AND RAILING REPLACEMENT)	Requires closure of QEW for 6± months - results in rerouting of 7,000,000 vehicle trips.	Requires closure of QEW for 6± months - results in rerouting of 7,000,000 vehicle trips	Requires closure of QEW for 6± months - results in rerouting of 7,000,000 vehicle trips	Requires closure of QEW for 6± months - results in rerouting of 7,000,000 vehicle trips.	Requires closure of QEW for 6± months - results in rerouting of 7,000,000 vehicle trips	Requires closure of QEW for 6± months - results in rerouting of 7,000,000 vehicle trips	Requires closure of QEW for 6± months - results in rerouting of 7,000,000 vehicle trips.	Deck and railing can be replaced once new Canal crossing structure is open - No rerouting of traffic required.
• **FUTURE TRAFFIC REQUIREMENTS** (BEYOND STAGE I)	Provides no flexibility to handle projected traffic volumes. In fact, with this alternative, additional capacity would have been required by 1978±	Provides no flexibility to handle projected traffic volumes. In fact, with this alternative, additional capacity would have been required by 197[illegible]	Provides no flexibility to handle projected traffic volumes. Even with this alternative, additional capacity would have been required by 1976±.	Provides no flexibility to handle projected traffic volumes. Even with this alternative, additional capacity would have been required by 1980±	Provides minor flexibility to handle projected traffic volumes. Even with this alternative, additional capacity would be required by 1987±.	Provides no flexibility to handle projected traffic volumes. Even with this alternative, additional capacity would have been required by 1981±.	Provides minor flexibility to handle projected traffic volumes. Even with this alternative, additional capacity would be required by 1990±.	Handles projected traffic volumes until 2004± Beyond this time, the ability to add a further lane in stage 3 provides additional flexibility.
EFFECTS ON SOCIAL ENVIRONMENT								
• **MUNICIPAL OFFICIAL PLANS**	Results in a constraint to municipal development	Results in a constraint to municipal development	Results in a constraint to municipal development	This alternative is proposed in local O.P.s but would result in a constraint to municipal development if carried out in isolation from QEW widening	This alternative is proposed in local O.P.s but would result in a constraint to municipal development if carried out in isolation from QEW widening	Results in a constraint to municipal development.	This alternative is, in part, proposed in local O.P.s but would result in a constraint to municipal development if carried out in isolation from QEW widening.	This alternative forms part of local O.P.s along with other proposals and would remove a constraint to orderly municipal development.
	THESE ALTERNATIVES WERE ELIMINATED EARLY IN THE STUDY PROCESS BECAUSE THEY DID NOT SOLVE THE IDENTIFIED DEFICIENCIES FOR THIS REASON THEY WERE ANALYZED IN LESS DETAIL THAN OTHER ALTERNATIVES							
• **LAND-USE**	No condition change	No condition change	No condition change	No condition change	The construction of 20 km± of new roadway through predominantly urbanized areas (E-W & N-S Transportation Corridors and Industrial Perimeter Road) will have significant social and natural environmental effects. The extent of these effects has not been documented in this report although the N-S & E-W Transportation	The construction of 50 km± of new roadway through predominantly rural areas will have significant social and natural environmental effects. The extent of these effects has not been calculated as plans have not been developed. However, a 50 km roadway would require 500 ha of land (much of which is in agricultural	Condition changes will be the sum of those identified for other alternatives.	No condition change except for minor requirements for highway widening.
• **COMMUNITY**	No condition change	No condition change	No condition change	No condition change				25 houses to be removed (5 owned by MTC).
• **NOISE**	Minor noise level increases will occur as traffic volumes increase	Minor noise level increases will occur as traffic volumes increase	Minor noise level increases will occur as traffic volumes increase	Minor noise level increases will occur as traffic volumes increase				Overall noise levels in residential areas will decrease.

ALTERNATIVES AND EVALUATION

	ALTERNATIVES TO THE UNDERTAKING							
	DO NOTHING	LOCALIZED GEOMETRIC IMPROVEMENTS	TRAFFIC OPERATION IMPROVEMENTS	INCREASE VEHICLE OCCUPANCY RATES	IMPROVEMENTS TO LOCAL ROAD SYSTEM	IMPROVEMENTS TO PROVINCIAL HIGHWAY SYSTEM	COMBINATION OF ALTERNATIVES	WIDEN Q.E.W.
EFFECTS ON SOCIAL ENVIRONMENT (continued)								
· HERITAGE RESOURCES	No condition change	No condition change	No condition change	No condition change	Corridors are the subject of an E.A. by the Region of Hamilton-Wentworth	usage) and either 2 or 4 crossings of the Niagara Escarpment		No unique resources removed.
· AESTHETICS	No condition change	No condition change	No condition change	No condition change				Highway widening and vegetation removals landscaping and barrier screening.
· INDUSTRY, TRADE AND COMMERCE	Continued deterioration of existing constraints to work force movement and market accessibility	Continued deterioration of existing constraints to work force movement and market accessibility	Continued deterioration of existing constraints to work force movement and market accessibility	Continued deterioration of existing constraints to work force movement and market accessibility				Improved accessibility.
· AGRICULTURE	No condition change	No condition change	No condition change	No condition change				No condition change
EFFECTS ON NATURAL ENVIRONMENT								
· WATER	No condition change	No condition change	No condition change	No condition change	—			Minor effects due to 0.5 ha of fill in harbour - 3 structures over Red Hill Creek required in Stage 3.
· AIR	Emissions will increase as slow downs and stoppages become more frequent	Emissions will increase as slow downs and stoppages become more frequent	Emissions will increase as slow downs and stoppages become more frequent	Emissions will increase as slow downs and stoppages become more frequent				Free traffic flow conditions are expected to reduce emissions caused by stop and start conditions
· VEGETATION (TREES)	No condition change	No condition change	No condition change	No condition change	-		—	1.5 ha of vegetation to be removed - none identified as being of high quality.
· WILDLIFE	No condition change	No condition change	No condition change	No condition change	-		—	Possible minor disturbance to bird and reptile habitat in vicinity of Red Hill Creek.
· ENVIRONMENTALLY SENSITIVE AREAS	No condition change	No condition change	No condition change	No condition change	—		—	Minor filling of Red Hill Creek Marsh/Van Wagners Marsh (0.3 ha)
CAPITAL CONSTRUCTION COSTS	0	0	Not estimated	Not estimated	$170 million ±	$200 million ±	$170 million ±	$48.5 million

The evaluation of the alternatives was carried out with a detailed numerical evaluation during the 1972/74 study and with a qualitative assessment of the earlier work and the updated data during both the 1978/79 study and the 1981 reassessment of the 1979 submission.

The numerical evaluation that was carried out in 1972/74 included three steps:

- Factor weighting
- Unweighted route comparison
- Weighted route comparison

The factor weighting provided for the distribution of 100 points amongst the factors that were analyzed.

During the 1972/74 study this weighting was carried out by the Project, Internal, External and Public Teams using a method known as the Falk method. This method involves the use of a questionnaire in which each factor is paired with another factor and the respondent is asked to indicate which factor in each pair is considered to be more important. The choice from each of the 36 factor pairs is then analyzed and summarized as a factor weight.

The unweighted route comparison provided for the assignment of points to a particular alternative for a specific factor. The best alternative with regard to a particular factor would receive 10 points and all other alternatives would receive points from 0 to 10 depending on the individual's assessment of how much worse the other schemes were in comparison to the best one.

The weighted route comparison was obtained by multiplying the factor weighting by the unweighted route comparison and by adding the resulting weighted route comparisons for all factors. The alternative with the highest number (potential maximum 1,000) would be the best alternative as determined by the numerical evaluation.

Tables summarizing the results of both the analysis and evaluation that was carried out during the 1972/74 study are included in Appendix E.

4.2.1 Cross Section

Three basic concepts were identified during the 1972/74 study, all of which would provide for different freeway cross sections.

Concept 1 would involve the redevelopment of the Queen Elizabeth Way between Guelph Line and Highway 20 as a basic eight lane freeway with a two lane exclusive transit core roadway for express buses.

Concept 2 would involve the redevelopment of the Queen Elizabeth Way as a collector-distributor system with a six lane core and parallel two lane, one way collector roadways. This concept assumed that express transit buses would operate on the freeway lanes.

Concept 3 would involve the redevelopment of the Queen Elizabeth Way as a collector-distributor system with an eight lane core and parallel two lane, one way collector roadways.

With all three of these concepts, it was assumed that the existing lift bridge crossing of the Burlington Canal would be retained and that it would continue to provide a two lane arterial roadway function connecting Beach Boulevard in Hamilton with Lakeshore Road in Burlington.

During the 1978/79 study, one additional concept was identified. This was developed following an investigation of the possibilities that might be available to offer "immediate" relief to the corridor and to provide a means of staging the construction of the long-range Queen Elizabeth Way redevelopment. This additional concept involved the redevelopment of the Queen Elizabeth Way between Guelph Line and Highway 20 as a basic eight lane freeway plus the modification of the existing lift bridge to provide for the development of a four lane arterial roadway across the Beach Strip between Highway 2 in Burlington and Burlington Street in Hamilton. This four lane arterial roadway represents the approved Stage 1 redevelopment of the Queen Elizabeth Way.

ALTERNATIVES AND EVALUATION

At the conclusion of the 1972/74 study the cross section that was selected was as follows:

> "Concept 1 was selected over the other two concepts as this plan will best satisfy the transportation needs and relevant environmental and social considerations identified in the course of the study. Of those polled, more than 50% of the public preferred Concept 1.
>
> "This concept will involve the initial construction of an 8 lane divided freeway. During this first stage, express buses will operate between Burlington and Hamilton using freeway lanes.
>
> "At a later date, an exclusive express bus roadway would be constructed within the right-of-way".

During the 1978/79 study the earlier recommendations with respect to the cross section were reassessed. At that time, the potential transit ridership within the Queen Elizabeth Way corridor was identified as approximately 5%. The former recommendation to provide for a separate transit facility within the median of the Queen Elizabeth Way had been based on the assumption that approximately 25% of traffic within the corridor could be diverted to transit. With the prediction that the modal split would be only 5%, the Ministry decided to delete the transit facility from the previously recommended concept recognizing that the predicted 5% transit ridership could be handled by buses operating on the freeway lanes.

Also during the 1978/79 study the concept of incorporating a four lane arterial along the Beach Strip was identified. This arterial was identified as providing a number of benefits:

o It could be implemented more rapidly than a new Queen Elizabeth Way Canal crossing and therefore could offer more immediate relief to the corridor.

o It would provide an improved emergency route for closures due to accidents, maintenance operations or adverse weather conditions on the Skyway while the new Queen Elizabeth Way Canal crossing is being constructed.

o It would provide good arterial access to the Beach Strip after completion of the new Queen Elizabeth Way Canal crossing.

As a result of the 1978/79 reassessment of the 1972/74 study, the Ministry decided that the earlier recommendation should be modified.

The recommended concept resulting from the 1978/79 study was, therefore, to construct a basic 8-lane freeway with no separate provision for a transit facility within the median (recognizing that transit could be handled by buses operating on the freeway lanes), and to provide a parallel 4-lane arterial roadway along the Beach Strip.

Environmental Assessment approval of the 4-lane arterial roadway (Stage 1 redevelopment of the Queen Elizabeth Way) has now been given.

As part of the 1981 reassessment of the 1979 submission, the Ministry of Transportation and Communications has assessed the recommendation to proceed with the construction of the eight-lane freeway.

On the basis of existing traffic volumes the need exists today to provide one additional lane in each direction on the Queen Elizabeth Way. See figure 13. In addition, the projected traffic volumes indicate the need for a further lane in each direction to handle the traffic volumes that are predicted to occur shortly after the year 2001.

On this basis the Ministry of Transportation and Communications proposes that the existing four lane cross section on the Queen Elizabeth Way be modified to provide a six lane cross section and that this six-lane cross section be constructed in such a fashion that it can easily be modified to eight lanes at some future date.

4.2.2 Alignment

During the 1972/74 study alternative alignments were considered in three locations. These were between Fairview Street and Highway 2, at the Burlington Canal crossing and between the Skyway and Woodward Avenue.

The section of the freeway between Fairview Street and Highway 2 will be constructed as part of the approved Stage 1 redevelopment of the Queen Elizabeth Way and therefore it is not discussed in this report.

At the Burlington Canal crossing it is necessary to shift the future alignment so that the existing Skyway can be kept in operation while the new construction takes place. In this location the shift was recommended to be to the west (Harbour side) of the existing Skyway in order to avoid the removal of homes and the sewage treatment plant on the east of the existing freeway.

Between the south limit of the Skyway and Woodward Avenue four alternative alignments were considered. The four alternatives were developed recognizing the need to consider the impact of the highway on both the residential properties to the east of the freeway and the Hamilton Harbour to the west of the freeway.

During the late 1960's the Ministry of Transportation and Communications had carried out a study to identify the extent of property requirements to provide for a future widening of the Queen Elizabeth Way. At that time a proposed property limit had been established across the Beach Strip, that would result in the acquisition of 15 m - 45 m of property to the east of the existing highway property boundary. During the early 1970's the Ministry of Transportation and Communications acquired, on a voluntary sale basis, approximately 90 of the 115 residential buildings that fell within this widened right-of-way.

The alternatives that were identified within this section were developed on the basis of maintaining either the existing east property limit or the limit to which the Ministry had been acquiring properties in the early 1970's.

Route A was developed on the basis of widening the Queen Elizabeth Way about its existing centre line. This alternative would result in the need to acquire property on both the east and west sides of the highway. This alternative did not include any provision for the installation of noise barriers.

Route B was developed on the basis of maintaining the existing east property boundary and carrying out all of the widening to the west. This would result in a westerly shift of the freeway centre line. This alternative did not include any provision for the installation of noise barriers.

Route C was developed on the basis of maintaining the existing east property boundary, constructing a noise berm adjacent to the east limits of the highway right-of-way and carrying out all of the widening to the west. This would result in a westerly shift of the freeway centre line.

Route D was developed on the basis of maintaining the existing centreline of the highway and constructing a noise berm adjacent to the east limits of the highway right-of-way. This alternative would require the complete right-of-way identified for acquisition in the late 1960's.

During the evaluation of these alternatives in the 1972/74 study it was concluded that:

> "The key issues over the limits of this section were community impact, noise and encroachment on the Hamilton Harbour. Of the four route alternatives, only Route 'C' and 'D' provided for noise abatement. Route 'C' would involve the maximum shift to the harbour side and no impact on the residential area.
>
> "Route 'D' would involve less filling of the harbour and some acquisition of residential property. After careful consideration of the environmental and social concerns, the Ministry has selected Route 'D'. Of those polled approximately 50% of the public preferred Route 'D' over the other three routes."

During the subsequent reassessments of the 1972/74 recommendation it was concluded that the earlier recommendation was still valid. On this basis the Ministry of Transportation and Communications is proposing that the existing alignment be maintained between the south limit of the Skyway and Woodward Avenue.

4.2.3 Grade

During the 1972/74 study alternative grades were considered at the Burlington Canal crossing and between Guelph Line and Highway 2. The alternative grades at the Canal Crossing are discussed separately within section 4.2.4.

Between Guelph Line and Fairview Street, the alternatives that were analyzed were those of retaining the existing grade or depressing the grade and reversing the existing overpasses with the two Canadian National lines, Brant Street, Fairview Street and Highway 2.

During the evaluation of these two alternatives in the 1972/74 study it was concluded that:

> "The existing grade alternative was selected over the depressed grade even though approximately 80% of those polled preferred the depressed grade.
>
> "Over the Burlington sections, the increase in cost to depress the grade is more than $10 million(1). The lowering of the grade would further reduce the noise levels by between 3 and 5 dBA.
>
> "The Ministry does not consider this substantial additional expenditure to be warranted in view of the moderate decrease in noise levels and in view of the fact that Route 'B' over the Burlington South(2) section will considerably reduce the present noise levels."

The subsequent reassessments of the 1972/74 recommendations with respect to grade did not indicate a need to modify the earlier recommendations.

4.2.4 Burlington Canal Crossing

Two basic options are available to provide increased capacity on the Queen Elizabeth Way across the Burlington Canal. These two options are to provide either an additional bridge(s) or to provide a tunnel(s). Both of these options have been under review by the Ministry of Transportation and Communications since the mid nineteen sixties when it became apparent that future traffic volumes would exceed the capacity of the existing Burlington Skyway. During this time many variations to the two basic options have been investigated. These have included different numbers of lanes, different draft clearances within the Canal, staging options and varying design and construction techniques that have reflected the changing state of the art in bridge and tunnel construction. These changing parameters have resulted in differing relative costs between the bridge and tunnel options.

DESIGN PARAMETERS

The design parameters that have been used for the bridge and tunnel for the purpose of the present analysis are as follows:

- Number of Lanes
- Vertical Clearance
- Grades
- Shoulders
- Staging Options
- Structural Design of Bridge
- Structural Design of Tunnel

---

(1) 1973 construction dollars

(2) This refers to the section between Fairview Street and Highway 2 that will be constructed as part of the approved Stage 1 redevelopment.

ALTERNATIVES AND EVALUATION

Number of Lanes

The complexity of the structure that will be required to cross the Burlington Canal is such that it is not economically feasible to develop either the bridge or tunnel so that extra lanes can be added after a few years if it is found that traffic growth warrants it. Rather, the structure should be built to accommodate the anticipated traffic growth over the projected life of the structure (50-100 years). In this regard the Ministry of Transportation and Communications has carried out the analysis of the Canal crossing on the basis of providing capacity to match the freeway capacity on the approaches to the Canal in Stage 3 of the Queen Elizabeth Way redevelopment, that is four lanes in each direction.

Because of the long grades associated with either the bridge or tunnel, it will be necessary to add a truck climbing lane on the up grades so that the approach roadways and the Canal crossings have comparable traffic handling capacities.

In the case of the bridge, the truck climbing lane must be provided from the base of the Skyway to the crest. However, because of the potential hazard associated with discontinuing the truck climbing lane at the crest of the Skyway and therefore forcing a merge condition over 30 m above ground level, it was considered desirable to continue the truck climbing lane down the Skyway to the at grade condition. On this basis the Skyway cross section would provide for five lanes (four through lanes plus a truck climbing lane) over its entire length in order to provide a comparable capacity to the four lane at grade approaches.

In the case of the tunnel, the truck climbing lane need only be provided to accommodate vehicles after they have exited from the tunnel and are beginning to climb the grade. On this basis the tunnel cross section would provide for four lanes on the approach grade and through the tunnel structure and would provide for five lanes (four through lanes plus a truck climbing lane) on the grade exiting from the tunnel structure. These cross sections are also adequate to handle the existing, two way, Queen Elizabeth Way traffic during rehabilitation of the existing Skyway.

Vertical Clearance

The Skyway must provide for the passage of unloaded lake freighters when the water level in the lake is high. This requires a clearance of 36.6 m from the water level to the underside of the Skyway. As the bridge deck will be over 3 m in depth this results in the roadway being approximately 40 m above the high water level in the Canal. The high water level is established by Transport Canada.

The tunnel must provide for the passage of loaded lake freighters when the water level in the Canal is low. The existing Canal provides for vessels with a "draft" of 8.2 m (27') which is typical of the minimum clearance that is provided throughout the St. Lawrence Seaway system. The Hamilton Harbour Commission has stated, however, that any new tunnel must be provided with a clearance that would allow for the passage of vessels with a draft of 10.7 m (35'). Over and above the 8.2 m or 10.7 m draft clearance, a margin of safety of 1 m must be provided to any physical obstruction at the bottom of the Canal. 1.5 m of granular material would then be required to provide protection to the actual tunnel structure so that falling debris or dragging anchors would not damage it. The roof of the tunnel would be a minimum of 1.5 m thick for an 8.2 m draft and approximately 2 m thick for a 10.7 m draft. The roadway within the tunnel would provide a clearance of 4.65 m to permit the passage of trucks. On this basis the roadway would be approximately 17 m (56 ft.) (to provide an 8.2 m draft) or 20 m (66 ft.) (to provide a 10.7 m draft) below the low water level in the Canal.

Grades

The grade on the existing Skyway is 3%. This is considered to be the normal maximum grade of a freeway. It would not be possible to alter the grade on the existing Skyway without completely rebuilding it.

The grade on a new bridge would match the existing Skyway for design, economic and aesthetic reasons.

For the tunnel option the length of grade would be less than for the Skyway. In addition the down grade would come before the up grade and therefore vehicles would start the climb with the additional momentum that would have been gained from the down hill section. On this basis a 4% grade was considered acceptable on the tunnel approaches to minimize cost and land use impacts.

Shoulders

The analysis of the bridge and tunnel options was carried out on the basis that minimum tolerable shoulders would be provided on either the bridge or within the tunnel. The inclusion of full width shoulders would have added several million dollars to both the tunnel and the bridge options. It should be noted that shoulders would be provided on the tunnel approaches and that only the approximately 200 m long tunnel section would be restricted to minimum shoulder widths.

Staging Options

As stated previously, it would not be economically feasible to add single lanes to the Canal crossing structure in the future. However, consideration was given, in the analysis of the two basic options, as to whether it would be possible to twin the capacity of the tunnel and remove the existing Skyway at some future date if this was considered either necessary or desirable. In this regard the analysis was carried out on the basis of tunnel concepts that provided for both a tunnel that would have no expansion possibilities and one that would have the capability to be expanded at a later date.

Structural Design of Bridge

The existing Skyway is not structurally capable of being widened or "double-decked". Consequently any new bridge must be structurally independent of the existing one. Because of the existing development to the east (Lake side) of the Skyway it was determined that any new structure must be to the west (Harbour side) of the Skyway. This applies equally to both the bridge and tunnel options.

Since the opening of the existing Skyway in 1958 the state-of-the-art of bridge design has changed significantly. For example, the cost to construct the new bridge with a main span over the Canal that would be identical to the existing truss design would be in the order of $20 million more than the most economical method that is available today.

The bridge design on which the analysis of the two basic options is being carried out is possible in either a steel or concrete beam type design but either material would result in a structure that appears as shown in figure 14. The Ministry of Transportation and Communications' Structural Office has proposed this type of design on the basis of economics, aesthetics and construction procedures as they relate to the present state-of-the-art.

Structural Design of Tunnel

During the past fifteen years the Ministry of Transportation and Communications has considered a number of significantly different design and construction techniques for a tunnel. In addition, so that a completely independent appraisal of the Ministry's investigations could be made, the Ministry retained the Consulting firms of Geocon, Fenco and Lanmer to comment on the feasibility of the Ministry's proposals. The results of the Ministry's and the Consultant's investigation of the technical and economical feasibility of being able to construct a tunnel under the Burlington Canal were documented in two reports: "Feasibility Study, Bridges-Tunnels, QEW Crossing at Burlington Canal-January 1973" and "Supplementary Feasibility Study, Proposed Tunnel under Burlington Canal-December 1979".

These reports dealt with both the requirements of providing a structure(s) that would only accommodate traffic in one direction and also a larger structure(s) that would accommodate traffic in both directions. The latter case is referred to in this report as the "twin" tunnel.

During the course of the investigations various options were considered for both the tunnel and for the approaches.

The tunnel options resulted in tunnels varying in length from approximately 120 m to 200 m depending on the construction technique employed. Within the actual tunnel section, the option of accommodating each of the one way, four

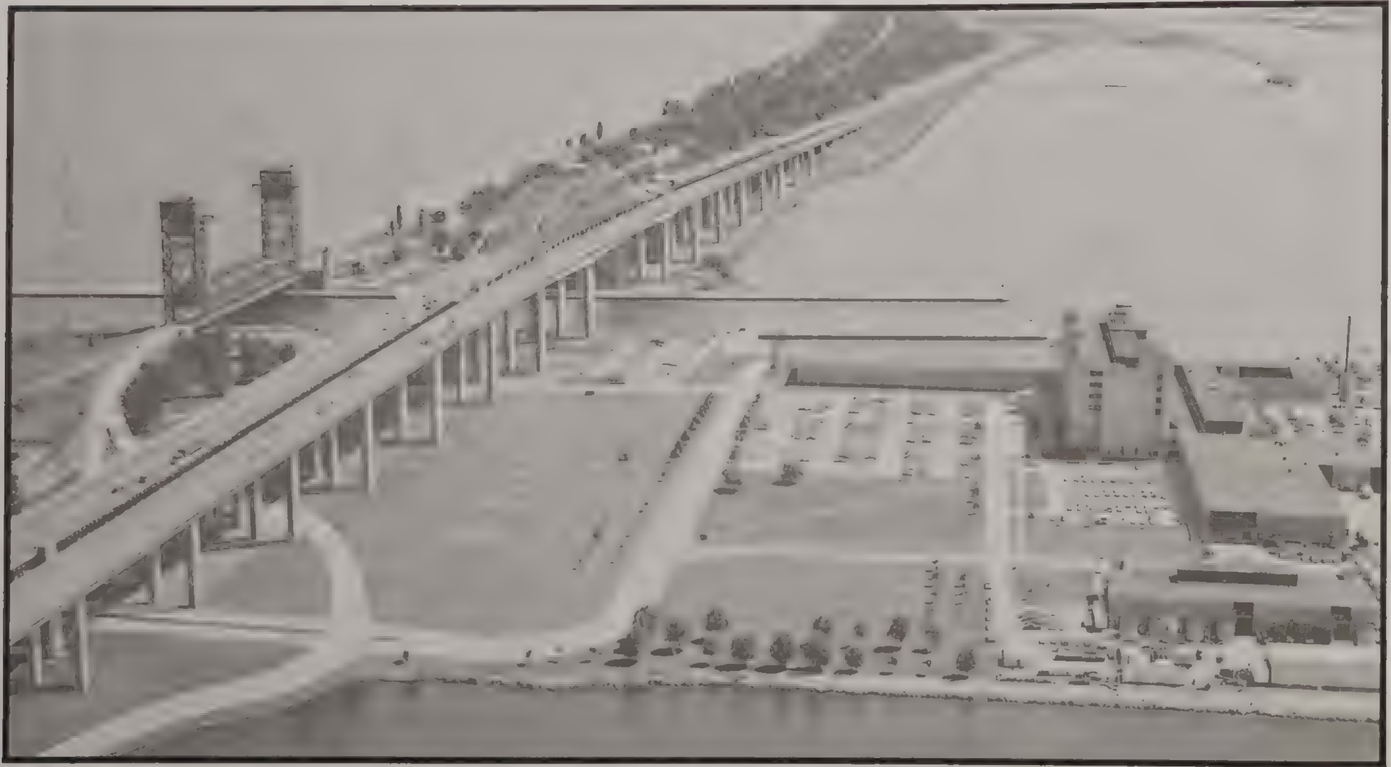


Figure 14

ARTISTIC SKETCH OF NEW SKYWAY

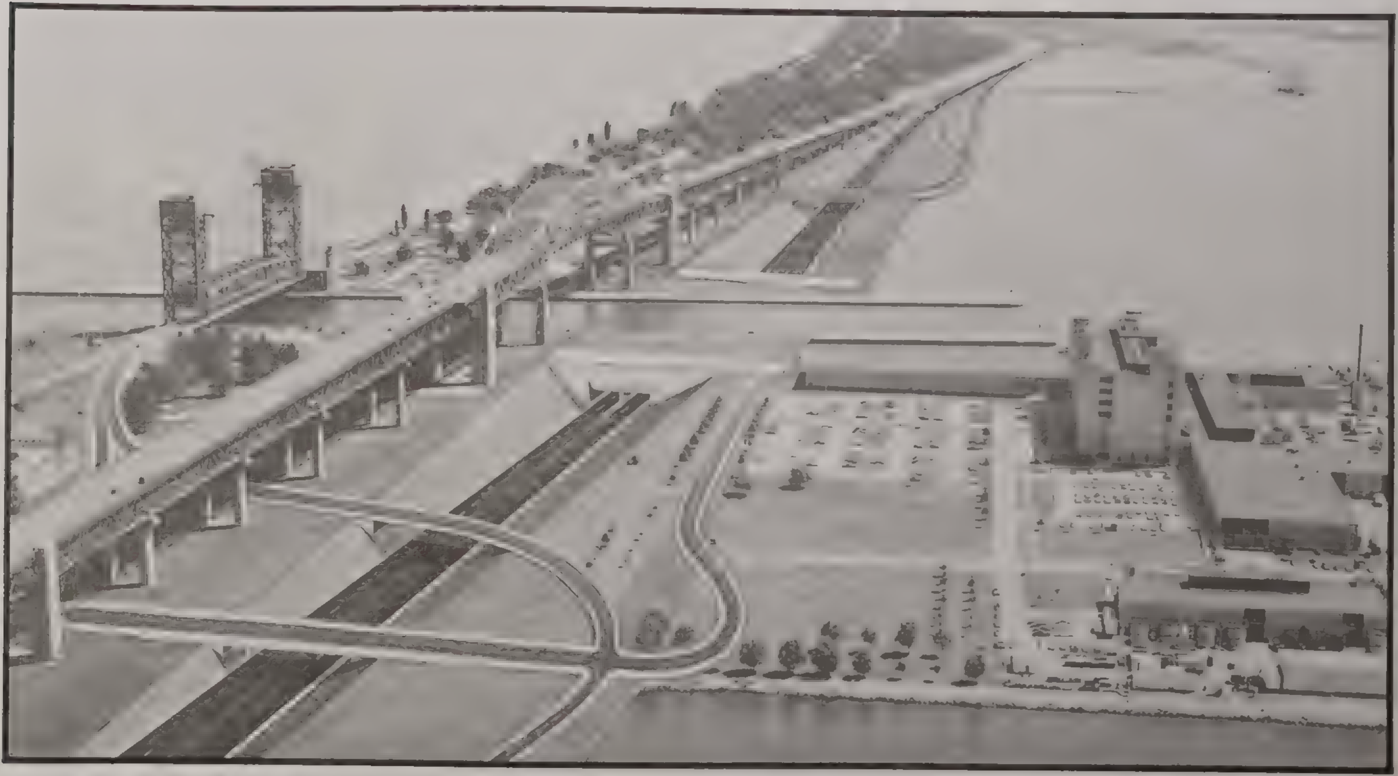


Figure 15

ARTISTIC SKETCH OF TUNNEL ALTERNATIVE

lane roadways within one four lane tunnel or two, two lane tunnels was considered. The two, two lane tunnels option would possibly result in a greater safety hazard than the single, four lane tunnel because of the need to split the traffic into two streams, but the single, four lane tunnel would require a more massive structure (thicker walls) than the two, two lane tunnels and would cost approximately $5 million more to construct. Although the option of constructing either the two, two lane tunnels or the one, four lane tunnel is a possibility for the 8.2 m draft, the additional depth and resulting stresses associated with the 10.7 m draft would preclude the use of the one, four lane tunnel. For the purpose of analysis the lower cost option (the two, two lane tunnels) has been assumed for both the 8.2 m and the 10.7 m drafts.

The alternatives that have been considered on the approaches have included three basic options. These were either retaining wall construction, braced sheet pile construction or open cut approaches inside vertical, impervious cut off walls. The first two of these options were not pursued for technical and economic reasons.

The relative costs of various tunnel concepts has varied and in some cases has reversed during the period of investigation, but the concept on which the present analysis has been carried out provides the least capital costs based on 1979 studies with prices inflated to 1981. The concept provides for either a 183 m long tunnel accommodating two, two lane roadways and providing for an 8.2 m draft or a 195 m long tunnel accommodating two, two lane roadways and providing for a 10.7 m draft within the Canal. The tunnel approaches provide an open cut section surrounded by an impervious cut off wall. The tunnel will be provided with a pumping station to remove both storm water and any seepage. The tunnel costs do not include for a mechanism to provide artificial ventilation as this is normally not required for stuctures less than 300 m in length. A conceptual sketch of the tunnel is included as figure 15.

ANALYSIS OF CANAL CROSSING ALTERNATIVES

On the basis of these various design parameters the bridge and tunnel options have been analyzed in terms of four basic considerations. These are:-

Cost
Social Impacts
Traffic
Natural Environment

Each of these four main areas of analysis has included a number of considerations. These are illustrated in the following table and subsequent explanation. In order to obtain a proper understanding of the table, it is stressed that it should be read in conjunction with the accompanying explanation.

The analysis was carried out for four alternatives for the development of a tunnel or bridge. These four alternatives are as follows:-

- Construct a second Skyway to the west of the existing Skyway to handle future Niagara bound traffic and modify the existing Skyway to become a one way structure handling the future Toronto bound traffic.

- Construct a tunnel to the west of the existing Skyway to handle future Niagara bound traffic and modify the existing Skyway to become a one way structure handling the future Toronto bound traffic. This tunnel would not incorporate the necessary features for it to be "twinned" at a later date.

- Construct a tunnel to the west of the existing Skyway to handle future Niagara bound traffic and modify the existing Skyway to become a one way structure handling the future Toronto bound traffic. This tunnel would be designed so that it could be

ALTERNATIVES AND EVALUATION

		SECOND SKYWAY	TUNNEL WITH NO EXPANSION CAPABILITY	TUNNEL WITH EXPANSION CAPABILITY	TWIN TUNNELS AND REMOVE SKYWAY
COST	EXPENDITURES				
	• INITIAL CAPITAL COST (1) (1981 $) (8·2m DRAFT/10·7 DRAFT)	$38m	$58·5m/$72·8m	$63·6m/$78·0m	$81 6m/$98 7m
	• MAINTENANCE COSTS	$1·4m	$1·7m	$1·7m	$2·0m
	LONG TERM USER BENEFITS				
	• ACCIDENT COST SAVINGS	$2·3m	$2·5m	$2·5m	$2·8m
	• VEHICLE OPERATING COST SAVINGS	$0 3m	$1·9m	$1·9m	$3·4m
	• TRUCK TIME COST SAVINGS	$12·6m	$12·5m	$12·5m	$12·5m
	• CAR TIME COST SAVINGS	$18 4m	$19·1 m	$19·1 m	$19·7m
	• SALVAGE COSTS	$1·4m	$2·5m	$2·5m	$3·2m
	SUMMARY OF COSTS				
	• DISCOUNTED (10%) NET COST SAVINGS (2)	$33·6m	$36·8m	$36·8m	$39·6m
	• DISCOUNTED (10%) CAPITAL COSTS (8·2m DRAFT / 10·7m DRAFT)	$27·4m	$42·1m/$52·4m	$45·8m/$56 2m	$57·9m/$70·1m
SOCIAL IMPACTS	NOISE	LEAST NET DECREASE	NET DECREASE	NET DECREASE	GREATEST NET DECREASE
	RESIDENTIAL LAND USE	NOISE, DUST, SALT, VISUAL	NOISE, DUST, SALT, VISUAL	NOISE, DUST, SALT, VISUAL	LESS IMPACT
	POTENTIAL RECREATIONAL LAND USE	NOISE, VISUAL	NOISE, VISUAL	NOISE, VISUAL	LESS IMPACT
	EXISTING INSTITUTIONAL LAND USE	MINOR IMPACT	C.C.I.W. IMPACT	C.C.I.W. IMPACT	C.C.I.W. IMPACT
	LAND AVAILABILITY	5 ha	DATUM	DATUM	DATUM
	PROPERTY REQUIRED (INCLUDING HARBOUR AREA)	15 ha	26 ha	30 ha	30 ha
	VIEW OF HIGHWAY	NOTABLE LANDMARK	NOTABLE LANDMARK	NOTABLE LANDMARK	SKYWAY REMOVED
	VIEW FROM HIGHWAY	PANORAMIC VIEW	PANORAMIC VIEW	PANORAMIC VIEW	PANORAMIC VIEW REMOVED
	HERITAGE RESOURCES	MINOR IMPACT	MINOR IMPACT	MINOR IMPACT	MINOR IMPACT
TRAFFIC	CAPACITY	SAME AS OTHER ALTS.	SAME AS OTHER ALTS.	SAME AS OTHER ALTS	SAME AS OTHER ALTS.
	ACCIDENT RATES	REDUCED	REDUCED	REDUCED	REDUCED
	FREQUENCY OF CLOSURES	SIGNIFICANTLY REDUCED	SIGNIFICANTLY REDUCED	SIGNIFICANTLY REDUCED	SIGNIFICANTLY REDUCED
	TRANSPORTATION OF HAZARDOUS GOODS	NO RESTRICTIONS	POSSIBLE RESTRICTIONS	POSSIBLE RESTRICTIONS	POSSIBLE RESTRICTIONS
	ABILITY TO REPLACE EXISTING SKYWAY	POSSIBLE	NO PROVISION	POSSIBLE	N/A
NATURAL ENVIRONMENT	HARBOUR FILL AREA	10 ha (0·5%)	20 ha (1·0%)	22 ha (1·1%)	22 ha (1·1%)
	HARBOUR FILL VOLUME	150,000 m^3 (0·05%)	450,000 m^3 (0·15%)	500,000 m^3 (0·17%)	500,000 m^3 (0·17%)
	WATER QUALITY	LEAST IMPACT (MINOR)	2nd GREATEST IMPACT (MINOR)	GREATEST IMPACT (MINOR)	GREATEST IMPACT (MINOR)
	VEGETATION	MINOR REMOVAL	MINOR REMOVAL	MINOR REMOVAL	MINOR REMOVAL
	WILDLIFE	MINOR IMPACT	MINOR IMPACT	MINOR IMPACT	MINOR IMPACT

(1) NOT INCLUDING WORK ON EXISTING SKYWAY (2) SUM OF LONG TERM USER BENEFITS MINUS MAINTENANCE COSTS

"twinned" at some future date. This would require the future approaches to be constructed in the initial stage.

- Construct a "twin" tunnel to the west of the existing Skyway to handle both Niagara and Toronto bound traffic and then remove the existing Skyway.

The last of these four is the only alternative for which a relocation of the existing Canal could be considered. The possibility of relocating the existing Canal was not pursued, however, on the basis that no benefits could be identified for the relocation but additional costs would be required to replace both the Canal and the existing lift bridge.

The analysis that is included within the table is grouped into Cost, Social Impacts, Traffic and Natural Environment. The basis for the analysis within each of these areas is as follows:

COST

Costs were analyzed in terms of both Expenditures and Long Term User Benefits.

EXPENDITURES

Initial Capital Cost

The cost for the second Skyway is based on an estimate of $31.7 million that was prepared by the Ministry of Transportation and Communications' Structural Office in 1979, together with an increase of 20% to allow for the change that had occurred in the Tender Price Index between 1979 and June 1981.

The costs for tunnel construction were based on 1979 estimates that were prepared by Geocon and documented in "Supplementary Feasibility Study - Proposed Tunnel under Burlington Canal". The Geocon figures had not included an allowance for engineering design and construction supervision and consequently the Ministry of Transportation and Communications increased the figures by 12% to make them comparable to the estimated cost of the bridge which had included this allowance. A further increase of 20% to allow for the change that had occurred in the Tender Price Index between 1979 and June 1981 was also included. Through discussions with counterparts in the U.S.A., the Ministry of Transportation and Communications Structural Office is aware that recent tender openings in the U.S.A. have indicated that tunnel prices have been escalating at a greater rate than bridge prices. However, in the absence of recent tunnel contracts in Ontario, the escalation rate for tunnels has been taken as being the same as the Tender Price Index which averages all types of highway construction in Ontario. $2 million was added to each of the tunnel alternatives to allow for the cost of constructing bridges over the tunnel approaches for both the arterial roadway and the access to the Canada

Centre for Inland Waters. This cost was not applicable to the Skyway alternative as the roadways would pass under the Skyway.

The cost of rehabilitation of the existing Skyway and the cost of removing the existing Skyway is virtually identical ($6 - $7 million). As all of the alternatives would require either the rehabilitation or removal of the existing Skyway, this common cost has not been added to any of the alternatives.

Maintenance Costs

Maintenance costs relate to the cost of maintaining the roadway and structures. The cost of vehicle maintenance is included separately under "vehicle operating cost savings".

Maintenance costs include snow removal, pavement repairs, lighting, pumping, painting, garbage removal, etc.

The figures included within the table are on the basis of long term discounted dollars. The method in which discounted dollars are calculated is discussed in the next section - Long Term User Benefits.

LONG TERM USER BENEFITS

Long term user benefits and costs were estimated by using techniques developed within the Ministry of Transportation and Communications. These techniques are documented within "Road User Benefit Calculation Package Manual" and "Input Data for Calculation of Vehicle Operating Costs". These documents, which are listed in Appendix B, are recognized as being at the forefront in the development of the state-of-the-art of predicting highway user benefits and costs.

A number of long term costs are included within the table. These are maintenance costs, accident cost savings, vehicle operating cost savings, and truck and car time cost savings. All of these values were calculated on the basis of discounted dollars. In other words an allowance was made for the difference between the present rate of return on an investment and the inflation rate. At the time of preparing this report, this difference was running at approximately 10% which is 20% ± interest rates minus 10% ± inflation rate. With this method of calculation, a dollar spent in 1991 would be worth 38¢ in 1981 or conversely 38¢ invested today at 20% would have a real buying power of $1 in 1991 if the inflation rate stays at 10%. This method of calculation is a normal approach used in assessing costs and benefits that are spread out over a long period of time. The use of a 10% discount rate was consistent with Provincial Management Board policy for assessing expenditures on Provincial projects, as of the time of carrying out this study.

For the purpose of the analysis, costs have been calculated over a 25 year period from the completion of construction of the new Canal crossing. The actual completion date for providing improvements in this corridor will be determined by a number of factors such as obtaining necessary approvals, availability of funds, property negotiations, construction time, etc. It is anticipated that a new facility in this corridor will be open towards the end of the 1980's. A figure of 1987 has been used for the purpose of the financial assessment. The operating costs and benefits have therefore, been calculated as accruing from 1987 to 2012. Beyond the 25 year period any benefits are extremely small when discounted at 10% to the present time and therefore they have virtually no affect on the relative merits of one alternative versus another.

The calculation of benefits has been carried out with the existing Skyway as the base for comparison. In other words, a vehicle operating cost saving of $1.9 million means that there will be a saving in vehicle operating costs in comparison to what would have occurred over the same time frame if no construction had taken place at the Canal crossing. The total vehicle operating cost for all vehicles on the crossing will of course be higher than the quoted $1.9 million but only the difference is considered to be a benefit.

The traffic volumes that were assumed for the purpose of calculating operating costs are those included in section 3.3.6. These volumes indicate a corridor traffic volume increasing from 67,000 A.A.D.T. in 1980 to 100,000 A.A.D.T.

in 2001. The benefits beyond 2001 were based on an extrapolation of the expected growth up to 2001.

In carrying out the present analysis of long term cost savings the differential in benefits between a bridge and a tunnel has been reduced from what was anticipated in 1979. This is due in part to the use of a 10% discount rate rather than the 3% rate that was current at that time. This is discussed later under "Discounted Net Cost Savings".

Accident Cost Savings

Accident costs were calculated on the basis of the number of vehicles, the anticipated accident rate and an estimated cost per accident.

The number of vehicles is as discussed in section 3.3.6 of the report.

The anticipated accident rate on the Skyway was calculated from an assessment of the historical accident rate on the existing Skyway. (Accident rates are defined as the number of accidents that occur for each million kilometres of vehicle travel).

Figure 16 provides a graph of traffic volumes and accident rates on the existing Skyway from 1962 to 1980. Some changes have occurred to affect the accident rates during this period of time such as lowered speed limits, seat belt legislation, removal of toll booths and changes in minimum damage costs for reporting accidents (only reported accidents are included in the Ministry's records). In addition there has been a significant, unexplicable, reduction in accident rates since 1978. However, the graph does indicate that until 1978 the accident rates on the Skyway have historically grown as the volume of traffic on the Skyway has grown.

At the time of the 1979 study of the bridge and tunnel an accident rate of 1.9 accidents per million vehicle kilometres had been assumed for both the existing and future Skyways. This was considered to be the worst case condition. From the examination of the historical accident rates on the Skyway it is apparent that this was an over simplification of the actual

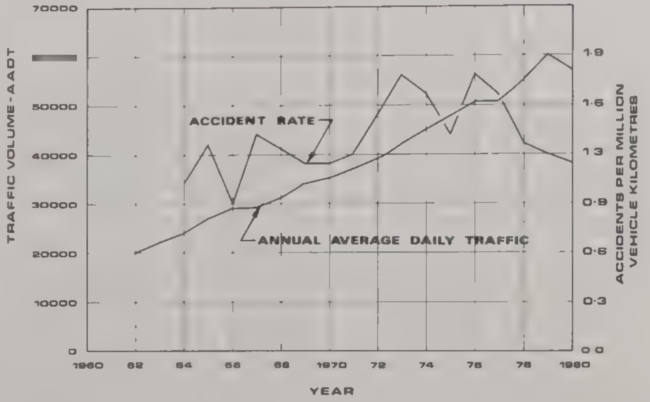


Figure 16

ACCIDENT RATES ON BURLINGTON SKYWAY

situation and that some method of relating the accident rate to the volume of traffic on the Skyway would provide a more reliable estimate for future accident rates.

The relationship between accident rates and volume of traffic on the Skyway has been approximated as follows:

$$\text{Accident Rate} = 1.25 \times \frac{\text{Annual Average Daily Traffic}}{\text{Theoretical Breakdown Capacity of Skyway}}$$

(The accident rate had initially been estimated as $2 \times \frac{\text{A.A.D.T}}{\text{capacity}}$ in terms of accident rates per million vehicle miles, but it is reported here in accident rates per million vehicle kilometres).

The theoretical breakdown capacity of the Skyway is 40,000 A.A.D.T. (Annual Average Daily Traffic) and the 1980 A.A.D.T. was recorded at 56,900 A.A.D.T. This would provide an estimated accident rate of 1.8 in 1980. The actual rate in 1980 was 1.25 but as stated previously the past three years have experienced what appear to be low accident rates. The estimated figure of 1.8 appears to provide a good fit with historic trends.

A further improvement in the accident rate is anticipated following construction due to the greater physical separation of the slow moving trucks from the higher speed auto traffic. This will be brought about by the increased number of through lanes and the addition of a separate truck climbing lane. The reduction in accident rate due to this can not be quantified, however and consequently, it has not been included in this analysis. This errs on the conservative side.

The anticipated accident rate for the tunnel alternative was previously estimated to be equal to the Provincial freeway average, which is approximately 0.8. This figure was assumed in the absence of an extensive data base related to tunnels in Ontario. The Thorold tunnel under the Welland Canal has some similarities to the tunnel that would be considered for the Burlington Canal but in general the traffic volumes are low and the design parameters are more restrictive at the Thorold tunnel. The accident rate for the Thorold tunnel is approximately twice the Provincial freeway average. In the absence of any directly comparable situations, the assumption that has been used for this analysis, is that the tunnel under the Burlington Canal would experience an accident rate comparable to the Provincial freeway average. This may err on the optimistic side recognizing (1) the fact that the tunnel would be split into two, two lane roadways with a pier in the median (2) the problems associated with the transition from light to dark and back again and (3) the potential for snow drifting into the open cut approaches.

The estimated cost per accident was based on Provincial statistics.

Vehicle Operating Cost Savings

Vehicle Operating costs were calculated to include gas and oil consumption, tire wear and an allowance for maintenance and depreciation costs. As the only difference between the bridge and tunnel is in the grades, the majority of the differences amongst the alternatives was due to gas consumption.

Time Cost Savings

The construction of a new Canal crossing will decrease the congestion on the existing Skyway. This will result in fewer stoppages and delays which in turn will result in time savings to occupants of vehicles crossing the Canal.

The time savings benefits are an identification of the total time saved assuming a value of $21.80 per hour for trucks and $3.20 per hour for each car occupant.

The time saving benefits are the largest individual benefit of those considered. However, the differences amongst the alternatives are not as great as with some of the other operating costs.

ALTERNATIVES AND EVALUATION

SUMMARY

Discounted Net Cost Savings

The discounted net operating cost savings represent the total operating cost savings, less maintenance, discounted at 10% to 1981, for the period from 1987 to 2012 (25 years).

It should be noted that these savings include a salvage value that represents the residual capital investment that remains in the structures by the year 2012. This figure is relatively small because of the long time period over which the discounting applies (1981 to 2012). This value compensates for the different life expectancies of the various alternatives.

It should also be noted that the maintenance costs are an additional cost rather than a benefit in comparison to the cost of maintaining the existing structure and therefore they are subtracted from the other operating cost savings in order to obtain the net operating cost savings.

Note Bene

The maximum differential in net operating cost savings between the twin Skyway and the tunnel options is $6.0 million. This compares with a figure of $21 million that was cited at the time of the 1979 study. The figure of $21 million included three different assumptions from those that are presently being considered. These were that the discount rate would be 3% (rather than 10%); that the horizon for calculating benefits would be 2001 (rather than 2012); and that the accident rate on the Skyway would be constant at 3 accidents per million vehicle miles (1.9 accidents per million vehicle kilometres) rather than varying as a function of traffic volumes as is presently being considered. In order to provide a comparison of the present analysis with the 1979 analysis a calculation was made of the net cost savings with present prices for gasoline, etc. but with a discount rate of 3%, a constant Skyway accident rate of 3 accidents per million vehicle miles (1.9 accidents per million vehicle kilometres) and a horizon year of 2012. The results of this calculation indicated that the Skyway plus tunnel alternative would have a net operating cost saving of $20.4 million in comparison to the twin Skyway alternative. This figure of $20.4 million represents an update of the $21 million that was cited in 1979, to reflect the same assumptions as have been considered for the present analysis.

In comparing the operating cost savings $3.2 million (present analysis) and $20.4 million (updated 1979 analysis) the differential is due to two factors. $7.2 million of the difference is due to the assumption of a more realistic accident rate that varies as a function of the traffic volume on the Skyway rather than assuming a constant rate of 3 accidents per million vehicle miles (1.9 accidents per million vehicle kilometres) and the balance of the difference is due to the assumption of a 10% discount rate rather than a 3% discount rate.

Discounted Capital Costs

The discounted capital costs represent the construction costs assuming a start in 1983 and completion in 1987. These dates can only be taken as assumptions for the purpose of this analysis. The actual dates will be determined by a number of factors as discussed previously. Capital costs were assumed to be spent uniformly throughout the period of construction and these expenditures were discounted at 10% to 1981.

SOCIAL IMPACTS

Noise

Noise levels were calculated at locations on the Beach Strip that are subject to the noise influence of the existing Skyway. The locations included ones immediately adjacent to the Skyway, ones on the actual Lake Ontario shoreline and ones at various locations in between.

Noise levels were calculated with the aid of a computer program as discussed in section 3.2.4. This program was used to calculate both existing and future noise levels.

Existing conditions represented the 1980 traffic conditions on the existing roadway system. Future conditions represented the year 2001 traffic projections as included in section 3.3.6 of this report and the roadway network as recommended under the Stage 3 redevelopment of the Queen Elizabeth Way.

In this regard it should be noted that both the existing and future roadway networks include a major arterial roadway across the Beach Strip and that this roadway contributes to the noise level on the Beach Strip. In particular it is of note that although the present Beach Boulevard is banned to through trucks except during emergencies it is anticipated that this ban will not apply to the new arterial, once it has been realigned away from the existing residential areas.

The increases or decreases shown in the summary table represent the average noise level changes. The individual changes for the various Skyway and tunnel options are included in section 3.2.4.

Residential Land Use

The existing land use on the Beach Strip to the east of the Queen Elizabeth Way is predominantly residential although both the Hamilton Region Conservation Authority and the Halton Region Conservation Authority have an ongoing program of property acquisition to permit the eventual development of the Beach Strip to a recreational land use.

The existing residential land use comprises approximately 620 homes but approximately 470 of these are beyond the limits of the existing Skyway. Of the remaining 150 homes that are within 1,300 m of the Canal, 110 are located within Burlington, to the north of the Canal and 40 are located within Hamilton, to the south of the Canal.

These 150 homes will be subject to the noise impacts that were discussed previously. In addition, the Skyway alternatives will result in greater salt spray, dirt and visual intrusion than the alternative that provides twin tunnels and requires the removal of the existing Skyway. No quantitative techniques are available to assess the extent of the impacts other than noise.

Potential Recreational Land Use

The Halton-Wentworth Waterfront Study of 1974 identified proposed recreational uses along the Beach Strip between Burlington and Hamilton.

The Hamilton Region Conservation Authority and the Halton Region Conservation Authority subsequently initiated a program for the acquisition of private properties on the Beach Strip. This program had resulted in the purchase of approximately 20% of private properties by 1981. The acquisition program is foreseen as continuing over a number of years.

No detailed plan for the use of the lands has yet been developed but it is anticipated that there will be a fairly intensive and active type of recreational use developed for this area.

Although no detailed plans have been prepared for the recreational use of the area, the Region of Halton has prepared a report "Halton Waterfront Plan, May 1981" which is a supplement to the Official Plan. This report identifies the lands, within Burlington, that are on the Beach Strip and to the east of the Queen Elizabeth Way as being developed as a "Regional Waterfront Park". Once again, no specific uses are identified within the report for the use of the Park but the area, which is designated as the Beachway Park, is identified as having a high priority for development.

Without a specific identification of the recreational uses that are proposed for the Beach Strip it is not possible to be precise as to the impacts. For example, the noise and visual impacts of the Skyway would be very different on go-karting or amusement park recreational uses than they would on family picnicking or walking type recreational uses.

In the absence of specific uses the potential impacts that are included in the table are those of noise and visual intrusion.

A further effect on recreational land uses would be that the twin Skyway would maintain the pedestrian accessibility (under the Skyway) to the Harbour shore line whereas the tunnel approaches would sever this access.

Existing Institutional Land Use

Existing institutional uses on the Beach Strip, that are within the limits of the existing Skyway, are the Canada Centre for Inland Waters to the west of the Queen Elizabeth Way and the sewage treatment plant to the east of the Queen Elizabeth Way. Both of these are within Burlington.

The sewage plant will not be affected by either the tunnel or Skyway construction but the Canada Centre for Inland Waters will be affected by the tunnel. Access to the Centre will be by means of a bridge over the approaches to the tunnel rather than by the existing roadway under the Skyway. In addition, the tunnel construction will require property from the front of the Centre although no physical structure will be required to be removed. The construction of the tunnel approaches will, however, require the open cut section to come within approximately 10 m of the Centre's hydraulics laboratory. The Ministry of Transportation and Communications does not believe that this will adversely affect the laboratory although representatives of the Centre have expressed concern. During detailed design of the tunnel approaches, it would be necessary to ensure the structural integrity of the hydraulics building.

Land Availability

Following construction of either the tunnel or the bridge, land will be available under the Skyway whereas it will not be available over the tunnel approaches.

The number included in the table identifies the land that will be available to the west of the existing Skyway. For the tunnel alternative the limit of the available land is defined as the easterly right of way at the top of the cut slopes.

It is not known at this time whether these lands would or would not be available for some active land use. However, the possibility exists to consider these lands as potential parking areas for the future recreational development.

Property Required (Including Harbour Area)

Property will be required on the Harbour side of the existing Skyway for either the tunnel or the bridge. This land is presently owned by the Hamilton Harbour Commission. The numbers that are included within the table include the additional area of fill that will have to be placed within the Harbour. The effects of this fill on the Harbour are assessed separately under "Natural Environment".

This factor has been included in order to identify the amount of total property that will be required for roadway purposes and is therefore not available for other land uses.

View of Highway

Conflicting opinions have been expressed to the Ministry with respect to the existing Skyway. These have varied from "impressive" to "ugly". It is recognized that the individual's perception of the existing Skyway is based on a number of personal experiences. Consequently, no attempt has been made to be judgemental with respect to the view of the highway. Rather the table has identified the Skyway as a landmark with the intention of leaving the decision as to whether it is a desirable or undesirable landmark to the individual.

View from Highway

The present view from the Skyway provides a panorama of the industrialized skyline in the Hamilton area as well as of Burlington and the Lake Ontario shoreline. No attempt has been made in the table to be judgemental as to the desirability or otherwise of this view.

With the construction of a new Skyway the parapet wall would be solid and, therefore, the panorama would be restricted on the up-grade. It will, however, be possible for passengers to obtain a view of the area on the down grade. No such panoramic view would be available from the tunnel alternatives.

Heritage Resources

No buildings or structures, other than the existing Skyway, will be removed by any of the alternatives.

TRAFFIC

Capacity

The tunnel and bridge alternatives have been designed to have comparable capacities. In the case of the bridge alternative, this has required the addition of an extra truck climbing lane over the entire structure whereas this was only required on the upgrade on the tunnel alternative. The addition of these lanes in order to provide comparable capacities is reflected in the initial capital costs associated with each alternative.

Accident Rates

Both the bridge and tunnel alternatives will be safe. As discussed previously under "Accident Cost Savings" the historical accident rate on the Skyway approximates to being a function of the ratio of traffic on the Skyway to its theoretical capacity.

With the construction of a second Skyway the theoretical capacity will be significantly increased and the accident rate should therefore improve.

Historically, many accidents on the Skyway have been caused either by high winds or by vehicles changing lanes when there has been a major speed differential between the slow moving vehicles in the right hand lane and the fast moving vehicles in the left hand lane. The construction of a new Skyway will provide additional lanes that will permit vehicles to be better spaced and therefore, not be so susceptible to hitting other vehicles when being buffeted by the wind. In addition, the extra lanes will permit a more gradual speed differential across the lanes from the slowest to the fastest.

No historical data is available for a tunnel in Ontario with similar traffic and operating characteristics as the Burlington Canal crossing. The Thorold tunnel experiences a higher than Provincial average accident rate (approximately double) but the circumstances in this location are not similar to those at the Burlington Canal crossing. The grades for the tunnel will not be as extensive as the bridge alternative although they will still be over 600 m in length and therefore will cause a speed differential between fast and slow moving vehicles.

Traditionally the transition from light to dark to light has created some difficulties on entering and leaving tunnels because of the problems of adjusting to different light intensities. However, with modern design techniques this is not anticipated to be a significant factor in causing accidents with the tunnel alternatives.

The separation of the four lane roadway into two, two lane sections within the tunnel (this was discussed previously under "Structural Design of Tunnel") will also present a potential hazard as it relates to the safety of the tunnel alternatives.

The major effect of the twinning of the freeway capacity at the Burlington Canal crossing will be to improve the level of traffic service which in turn will be the major determinant in improving the accident rate at this location.

Frequency of Closures

The existing Skyway is closed to traffic under conditions of high wind. The closure takes place in two stages with an initial closure to trucks and a second closure to cars when conditions become extremely severe. In the last five years, the number of closures has been from 1 - 2 times per winter.

The reason for the staged closure, with the initial banning of trucks, is due to their susceptibility to buffeting when they are unloaded. With the additional lanes that would be available on a second Skyway the possibility exists to designate two lanes to operate as a single truck lane during periods of high wind and consequently the number of operational limitations or closures due to high wind are anticipated to be less with a second Skyway than they are with the existing Skyway.

No closures due to high winds would occur with a tunnel although the failure of the pumping system could cause closures. This is, however, considered to be a very infrequent occurrence.

Transportation of Hazardous Goods

There are presently no limitations on the transportation of hazardous goods through tunnels within Ontario. However, there are such restrictions within the U.S.A. and it is conceivable that they might be implemented in Ontario at some future date. The severity of an accident involving hazardous goods could be greater with the tunnel alternative.

Ability to Replace Existing Skyway

The existing Skyway was opened in 1958 and will be approximately 30 years old by the time that the Stage 2 redevelopment has been completed. The specific life expectancy of the existing Skyway can not be predicted with accuracy although the Ministry's Structural Office has estimated that it has a residual life expectancy in the order of 50 years subject to good maintenance practices.

It is probable, however, that the existing Skyway will require replacement prior to whatever structure that is constructed in Stage 2 needing replacement.

In the case where a new bridge is constructed, sufficient physical space exists to replace the existing structure with a new bridge.

In the case where a tunnel is built without any provision for adding a second tunnel, there would be no space to locate a further tunnel or Skyway without first removing the existing Skyway.

In the case where twin tunnels are built initially the existing Skyway is assumed to have been removed as part of the initial construction.

NATURAL ENVIRONMENT

Harbour Fill Area

Both the bridge and tunnel alternatives will require the placement of fill in the Harbour. The figures shown in the table represent the total area of fill in the Harbour between the dyke surrounding the dredgate area to the south and Indian Creek to the north.

Harbour Fill Volume

The area of the Harbour that will be filled by the bridge and tunnel alternatives is generally shallow (0 - 2 m) as determined from nautical charts for the Hamilton Harbour. One exception to this is the possibility of a localized deep area (up to 18 m) in the vicinity of the arterial roadway where it swings to the south after crossing the tunnel approaches on the south side of the Canal. The arterial alignment for the Skyway alternative would not be far enough in to the Harbour to affect this deep area.

The Harbour fill volumes have been calculated on the basis of an average depth of water of 1.5 m except for the localized area referred to above.

Water Quality

The Ministry has been advised that the Ministry of Environment's computer model of the water quality within the Harbour is not sufficiently refined as to predict a difference in terms of water quality impacts of the alternatives on the Harbour.

Independent of the ability of the computer model to identify impacts, the loss of water surface area will reduce the aeration capability of the Harbour and the loss of volume of water will reduce the retention time in the Harbour. On this basis the alternatives that have the greatest fill and volume requirements in the Harbour will have the greatest impacts on water quality. The impacts shown on the table are rated as greatest to least although the Ministry of Environment considers that all alternatives will have a minor effect.

Vegetation

Approximately 1.5 ha of vegetation will be removed by any of the alternatives, but none of this has been identified as being of high quality.

Wildlife

The alternatives will have minimal impact on any identified wildlife within the corridor. Environmentally sensitive areas that have been identified in the general area are not affected by either the bridge on the tunnel alternatives. These are the hydro islands, the ponds in the dredgate spoils area and the Redhill Creek marsh area.

EVALUATION

In weighing the advantages and disadvantages of the alternative methods of crossing the Burlington Canal it was noted that the preferred alternative for each of the factors that was considered was either the twin Skyway or the twin tunnel and that the combination of Skyway and tunnel alternatives did not provide the most desirable solution for any factor. On this basis the intitial comparison was carried out between the twin Skyway and the twin tunnel alternatives.

The comparison of advantages and disadvantages for the twin Skyway and twin tunnel alternatives indicated the following:

o Capital costs would favour the construction of the twin Skyway ($38 million for the bridge versus either $81.6 million or $98.7 million for the tunnel depending on whether an 8.2 m (27') draft or a 10.7 m (35') draft is provided within the Canal).

o Long Term User Benefits would favour the construction of the twin tunnel with a discounted net saving of $39.6 million for the tunnel and $33.6 million for the bridge. These costs reflect long term savings in accident costs, vehicle operating costs, truck time saving costs, car time saving costs, salvage costs and maintenance costs.

o Noise effects would result in a net decrease with either alternative with the greater benefit being associated with the twin tunnel. The twin tunnel would result in a 0-5 dBA increase for 8 homes, a 0-5dBA decrease for 212 homes and a 5-10 dBA decrease for 125 homes. The twin Skyway would result in a 0-5 dBA increase for 42 homes, a 0-5 dBA decrease for 210 homes and a 5-10 dBA decrease for 29 homes.

o Residential Land Use effects would favour the construction of a twin tunnel because of the lower noise levels (see above), less salt spray, dirt and visual intrusion than with the bridge.

o Potential Recreational Land Use effects would favour the construction of a twin tunnel for similar reasons to those identified for "residential land use" because the recreational lands would be developed on the lands that are presently in residential use. The twin Skyway would however maintain the pedestrian accessibility (under the Skyway) to the Harbour shore line whereas the tunnel approaches would sever this access.

o Existing Institutional Land Use effects would favour the construction of a twin Skyway because it would have minimal impact on the Canada Centre for Inland Waters whereas the twin tunnel would be very close to the existing buildings and would require both the acquisition of property and the modification of the existing access.

o Land Availability would favour the construction of the twin Skyway because it would result in approximately 5 ha more land being available for other uses on the Beach Strip, than the tunnel.

o Property Required would favour the construction of the twin Skyway because it would entail the acquisition of 15 ha of land in comparision to 30 ha for the tunnel.

o View of Highway effects have not been identified as favouring either alternative.

- View from Highway effects have not been identified as favouring either alternative.
- Heritage Resources effects are identical for both alternatives and are minor in both cases.
- Capacity of the highway would be the same for both alternatives.
- Accident Rates would be similar for both alternatives.
- Frequency of Closures would marginally favour the construction of a twin tunnel because although the bridge alternative will still be subject to high winds, the additional lanes will result in the need for fewer closures than at present.
- Transportation of Hazardous Goods would favour the construction of a twin Skyway as no restrictions would be necessary with a bridge whereas they may become necessary with the construction of a tunnel. The severity of an accident involving such goods could be greater with the tunnel alternative.
- Ability to Replace Existing Skyway would not favour either the twin tunnel or the twin Skyway alternative as no replacement is required for the first and ample space to replace the existing Skyway is available for the second.
- Harbour Fill Area effects would favour the construction of the twin Skyway alternative as this would requie 10 ha of fill area in comparison to 22 ha with the twin tunnel alternative. The Ministry of Environment has indicated that these losses of 0.5% or 1.1% of the area of the Harbour are "minor" although the Hamilton Region Conservation Authority has expressed the concern that any loss must be considered undesirable as individual effects become cumulative with other losses over time.
- Harbour Fill Volume effects favour the construction of the twin Skyway alternative as this would require 150,000 m^3 of fill volume in comparison to 450,000 m^3 with the twin tunnel alternative. As with the 'fill area', the Ministry of Environment has indicated that these losses of 0.05% or 0.17% of the volume of the Harbour are "minor" although the Hamilton Region Conservation Authority has expressed concern over cumulative effects.
- Water Quality effects favour the construction of a twin Skyway in comparison to a twin tunnel because of the loss of surface area for aeration purposes and loss of volume for retention time as discussed above.
- Vegetation effects are identical for both alternatives and are minor in both cases.
- Wildlife effects are identical for both alternatives and are minor in both cases.

The advantages favouring either the twin skyway or the twin tunnel can be summarized as follows:

Twin Skyway Advantages

- Capital costs
- Existing institutional land use
- Land availability
- Property required
- Transportation of hazardous goods
- Harbour fill area
- Harbour fill volume
- Water quality

Twin Tunnel Advantages

- Long term user benefits
- Noise

- Residential land use
- Potential recreational land use
- Frequency of Closures

On the basis of the advantages and disadvantages of each alternative the Ministry of Transportation and Communications identified the twin Skyway alternative as being preferred in comparison to the twin tunnel alternative.

A comparison was then made of the twin Skyway with the combined Skyway and tunnel alternatives. In making this comparison it was noted that the existing Skyway has a residual life expectancy in the order of 50 years and therefore the combined Skyway and tunnel alternatives would operate until well into the next century. In making the comparison it was observed that the twin Skyway would have all of the advantages that were identified in its comparison with the twin tunnel except for the fact that the capital cost differential between the alternatives would be reduced ($38 million for the twin Skyway versus $58.5 million to $78 million for the combined Skyway and tunnel alternatives). However the advantages of the combined alternatives would be significantly reduced from those identified for the twin tunnel.

On this basis the Ministry of Transportation and Communications identified the twin Skyway alternative as the preferred method of crossing the Burlington Canal.

4.3 REVIEW OF EXTERNAL COMMENTS

Comments have been received by the Ministry of Transportation and Communications throughout the period of time that the Queen Elizabeth Way has been investigated. However, only those comments that have been made since the 1979 submission of the Environmental Assessment, and which related to Stages 2 or 3 of the Queen Elizabeth Way redevelopment have been included in this report. The comments have been grouped into three categories, these are Provincial Ministries and Agencies, Municipalities and the public.

4.3.1 Provincial Ministries and Agencies

During the Government Review of the 1979 submission to the Ministry of Environment, a number of comments were made with respect to the content of the report. These comments now form part of the public file on the 1979 submission.

In order to ensure a proper understanding of the various reviewer's comments, the Ministry of Transportation and Communications met with the Government Reviewers on July 3rd, 1981. It was concluded that most of the comments could be resolved in a new submission by either the incorporation of additional data or by providing a further explanation of the rationale for the undertaking or by providing further analysis and explanation of the alternative methods of carrying out the undertaking (with particular emphasis on the bridge and tunnel options at the Burlington Canal crossing). This has been done in the present report. However, individual meetings were considered necessary with a number of the reviewing agencies in order to further discuss the specific comments of those particular agencies. The specific comments that were discussed at those meetings are as follows:

Ministry of Energy

A meeting was held with Mr. B. Yang of the Ministry of Energy on July 13th, 1981. At the meeting Mr. Yang reaffirmed his earlier comments that in his opinion the question of load factors should be addressed within the Environmental Assessment report for the Stage 2 and Stage 3 redevelopment of the Queen Elizabeth Way. Load factors refer to passenger car or bus occupancy rates or to the freight loadings of trucks.

Mr. Yang identified the information that he would ideally wish to see within the Environmental Assessment report as comprising:

- Plot of historic load factors versus time for both peak and off peak conditions.
- Plot of maximum historic load factors that might have been possible with appropriate management techniques.

- Plot of future potential load factors if management techniques were applied to the existing roadway system.
- Plot of anticipated load factors following the twinning of the capacity at the Burlington Canal.

In terms of management techniques that might be considered for increasing load factors, Mr Yang cited:

- Ramp metering
- High Occupancy Vehicle Lanes
- Control of vehicle mix (truck restrictions)
- Traffic management systems
- Use of other existing roadways in conjunction with above measures, e.g. Beach Boulevard and roadways within Hamilton

Mr. Yang stated that the minimum desirable scheme from an energy efficiency viewpoint would be the one that at least maintained the existing load factor. If there was any reduction in load factor this could not be considered as a desirable scheme from an energy efficiency viewpoint. In this regard, Mr. Yang stressed the desirability of implementing management techniques that would assist in maintaining or improving the existing load factors.

Mr. Yang stated that although additional capacity may be required in the corridor to handle increased traffic volumes, that he could not endorse any capacity increase from an energy efficiency viewpoint unless there were accompanying improvements in load factors.

Management techniques that were considered as alternatives to the undertaking are discussed in sections 4.1.3 and 4.1.4 of this report. However, only a very limited amount of historical data is available on load factors within the Queen Elizabeth Way corridor and therefore, it is not possible to be specific as to either past trends or to extrapolate to obtain an understanding of future load factors that might be associated with the alternative techniques. Although little data on load factors is available, the following discussion attempts to address Mr. Yang's comments as quantitatively as is possible.

Load factors for automobiles were surveyed in 1972 and 1976 on the Skyway. In this period average auto occupancy for all trip purposes increased from 1.69 to 1.85. In the same time period, auto occupancy for work trips remained relatively constant at 1.24 and 1.22 for 1972 and 1976 respectively.

In comparison to other freeways in Central Ontario, the occupancy for work trips is similar, but when considering the average for all trip purposes, the occupancy of the Skyway is 25-30% higher, thus being more energy efficient than similar facilities.

Load factors for trucks using the Skyway have not been monitored and no data is available. Basically, load factors for trucks are a function of economic and regulatory factors and are controlled by the economic viability of the trucking industry. As fuel prices increase, it is likely that a corresponding increase in load factors will occur.

Several courses of action have been suggested that the Ministry of Transportation and Communications could investigate and implement, that would increase load factors on the Skyway. While it is not possible to estimate the impact that any or all or them would have on increasing load factors (and hence energy efficiency) several of these are actively being pursued by the Ministry of Transportation and Communications while the remainder are not considered applicable:

(1) High Occupancy Vehicle Preferential Treatment.

a) High occupancy vehicle lanes: This technique designates one lane of a multi-lane freeway for use by high occupancy vehicles, e.g. autos having, say, 3 or more persons, and transit vehicles. This encourages high occupancy rates by rewarding drivers with a faster flowing lane to travel in. While this technique has been applied successfully in the U.S.A., and has resulted in increasing vehicle occupancy, it is not applicable to the existing Skyway situation where one lane is already designated as a truck lane. A contraflow high occupancy vehicle lane could not be considered due to fairly high traffic volumes in the off peak direction, and because only one lane would be left to service that traffic.

American experience has shown that high occupancy vehicle lanes are most successful when implemented in advance of congestion, or at a time when additional lanes are being added to a facility.

The Ministry of Transportation and Communications through the Transportation Energy Management Program (T.E.M.P.) has developed guidelines for the implementation of high occupancy vehicle lanes throughout the Province. Provincial facilities including the Skyway will be subject to further investigation on the basis of these guidelines. This investigation will be carried out prior to or concurrently with the implementation of Stage 2 improvements.

(b) Ramp bypasses: In those cases where ramp metering is implemented (as discussed later), the ramp bypass technique permits high occupancy vehicles priority onto a freeway. While this technique has not been examined in detail for application in the Hamilton-Burlington area, it could be effective in increasing load factors for the morning and evening weekday peak congestion periods. For weekend recreational travel, the majority of trips have origins and destinations beyond the Hamilton-Burlington area and the system would be ineffective. Furthermore the average vehicle occupancy for summer recreational travel is already quite high (2.79 for summer Sundays). This technique could be investigated further, subsequent to Stage 1 implementation.

(2) Truck Restrictions in Peak Hours

The purpose of this technique is to restrict trucking in peak hours in order to free up existing capacity for use by autos which then operate under less congested and more fuel efficient conditions. This technique would improve operation of the Skyway during weekday peak hours. However, it fails to recognize the importance of trucking to the provincial economy and is contrary to the Ministry of Transportation and Communications' "quantity and quality standards for King's Highway service" which allow for the free movement of all vehicles on King's Highways at all times. The restrictions would do little to improve the flow of traffic on the Skyway during summer weekends when the truck percentage is very low, being 1% - 1.5%. Application of this technique would unlikely have any impact on load factors.

(3) Car and Van Pooling

Use of car and van pools is very effective in increasing load factors on highways, and hence in achieving greater energy efficiency for the trip to work, and affecting the weekday peak demand. For other trip purposes - personal, recreation, shopping etc., there is less opportunity to promote pooling since trip ends are widely dispersed and the time of day for travel is not limited to the peak hours. On an annual basis it is estimated that about 20% of all Skyway traffic is work trips. Therefore, the market penetration of car and van pool programs is limited to this share of the total number of vehicles.

The Ministry of Transportation and Communications through the Transportation Energy Management Program (TEMP) has for some time been actively pursuing the promotion of car and van pooling, the focus being on the establishment of car pooling and the promotion of the concept of company sponsored van pooling. The program is aimed at large employers who will set up car pool matching programs, or who will voluntarily purchase and operate vans for their employees. The program is marketed by means of presentations and technical assistance being provided by the Ministry of Transportation and Communications to large employers.

A major initiative presently under study by the Ministry of Transportation and Communications is the implementation of a pilot project for an area wide ride-sharing information service. This proposal would cover all Regions in Central Ontario from Hamilton-Wentworth to Durham. In this program, persons wishing to form car pools would register their home and work addresses with a central agency and would receive a list of all other interested persons with similar journey to work patterns. To supplement van and car pool operations, the Ministry of Transportation and Communications is installing commuter parking lots along major roads.

If the car and van pool promotions are successful, they will result in a reduction in the morning and evening, week day, peak hour demand on the

Skyway. They would not affect the summer weekend traffic or have much impact on the 80% of the traffic (including trucks) that is not work trip related.

(4) Flexible and Staggered Hours and Compressed Work Week
The effect of flexible and staggered hours is the spreading of start and ending times for the work day to provide relief to the peak weekday morning and evening hours, and to spread the normal peak hour travel into the adjacent hours. This also allows some spreading of the non-work travel. In the case of the compressed work week the objective is to compress the normal work week into 4 or less days, thus eliminating several work trips per week. This can have a major alleviating impact on both the work and non-work peaking. The two techniques tend to level out the peak hours and get better use of a facility. Many companies are already working to some form of altered work schedule and this has probably contributed to peak spreading on the Skyway which has spread from a one hour peak in 1972 to almost 3 hours in 1981.

The Ministry of Transportation and Communications through T.E.M.P. is presently conducting a study of alternative work schedules, in order to assess the transportation, energy and social effects of large scale changes in the traditional 9 to 5, five day a week, work pattern. While the potential transportation energy savings of these techniques is considerable, because they would result in less travel, they would not have a significant impact on load factors.

The Ministry of Transportation and Communications has no control over the implementation of alternative work schedules. If the present study finds them to be beneficial from both the social and transportation points of view, special demonstration projects may be developed. Only over time and within the context of acceptability by local labour and employers, can we observe the resultant impact of this technique. However, it is unlikely that this technique, by itself, would increase load factors.

(5) Traffic Management Systems
There are many techniques available, which, either collectively or individually, can be implemented to optimize the flow of traffic on facilities where delays due to congestion, weather, maintenance or accidents, occur at frequent intervals. The objective of these techniques is basically to warn motorists of congestion ahead to allow a motorist to use alternative routes, or to regulate the use of a facility (where alternative routes are not available) so that it can operate under less congested conditions. Energy savings are realized by the reduction of congestion, however, it is unlikely that these techniques would increase load factors and hence energy efficiency.

Several of the traffic management systems techniques are discussed below:

a) Ramp metering: The purpose of ramp metering is to regulate the number of vehicles entering a facility during congested periods, in order to facilitate the free flow of traffic and hence to improve the energy efficiency of the operation of the facility. This technique does not increase the capacity of the facility and the energy savings of the operation may be offset by fuel consumed by vehicles in the queues at the ramp terminals.

   No evidence exists that suggests ramp metering by itself will increase load factors. However, ramp metering is an integral component of ramp bypass techniques for high occupancy vehicles as discussed above.

b) Variable message signing: This type of sign is placed in advance of known problem areas and alerts drivers to conditions ahead, such as accidents, congestion, etc. Variable message signs identify the problem and suggest alternative routes of travel.

   This technique has limited application to the Skyway under todays conditions, since the number of alternative routes is limited - very little surplus capacity exists in the Skyway Corridor itself (only the Queen Elizabeth Way and Beach Boulevard) with the other alternatives being the routing of traffic through the City of Hamilton via local streets and Highway 403. Problems already exist on Hamilton streets and it would be unacceptable to route provincial traffic (including trucks) through the city of Hamilton except on an occasional emergency basis.

The variable message signing technique is being studied for application after the 4 lane Beach arterial has been opened (Stage 1). The purpose will be two-fold, to get optimum use of both the Skyway and the Beach arterial under normal heavy periods of operation, and to provide for emergency routing of traffic when accidents, weather, or maintenance operations result in the total or partial closure of either roadway. The study will also investigate the application of this technique after the Stage 2 (6 laning) and will be looking at variable illumination levels for the Skyway to conserve energy and to improve visibility under variable weather conditions, for safety considerations.

Energy savings of this technique will result from getting optimum use and flow on the two facilities and by the reduction of stop and go traffic in emergency situations. There is unlikely to be any increase in load factors from this system yet it may assist in maintaining existing levels.

(6) Other Initiatives

The Ministry of Transportation and Communications through T.E.M.P. is pursuing other energy saving initiatives including driver education directed towards fuel efficiency, investigation of alternative fuels for transportation, reduced speed limits, testing of automobile maintenance standards and others. In addition, the Ministry of Transportation and Communications in cooperation with the Ministry of Energy is undertaking reviews of energy management strategies for two major cities, Hamilton and Toronto. The energy conservation measures being examined in the Hamilton Study are: alternative signal timing plans; alternative traffic control measures at local intersections; express bus service on selected routes; transit vehicle priority at traffic signals; controlled parking and loading in the downtown area; additional promotion of car and van pool programs; fringe parking lots for car and van pool assembly, alternative work schedules; and improved transportation facilities for low energy vehicles. While these will contribute to increased load factors and greater energy efficiency, they will not delete the requirements for more capacity in the Skyway corridor.

The one key factor that is likely to result in transportation energy conservation is increased fuel prices. As a result of the recent Alberta/Federal energy pricing agreement, fuel prices will approximately double by 1986. This increase in price, in conjunction with the increased public awareness of energy conservation resulting from the Ministry of Energy's media campaign, will bring about increases in car pooling and transit usage (and load factors), a more fuel efficient automobile fleet, and an overall reduction in the energy requirements of transportation in Ontario.

Ministry of Culture and Recreation

Meetings were held with Mr. D. Cuming of the Ministry of Culture and Recreation on July 8th, 1981 and on August 26th, 1981. Mr. Cuming's specific concerns as they related to the Ministry of Culture and Recreation were with respect to the analysis, evaluation and documentation of data related to the heritage resources within the corridor.

This information is documented in section 3.2.5, 3.2.6 and section 5 of this report.

Ministry of Environment

A meeting was held with Mr. I. Veitch and Mr. H. Gidamy on July 16th, 1981. Mr. Veitch indicated that although many specific comments had been made by the Ministry of Environment the prime areas of concern were those of rationale for the undertaking, alternative methods of carrying out the undertaking with particular reference to the alternatives at the Burlington Canal crossing and the assessment of noise within the corridor.

The question of rationale is discussed in section 1.5 of this report. The analysis and evaluation of the Burlington Canal crossing alternatives is discussed in section 4.2.4. The reassessment of the corridor in terms of noise is discussed in section 3.2.4 and section 5.

Ministry of Treasury and Economics

A meeting was held with Ms. C. Lonero of the Ministry of Treasury and Economics on July 16th, 1981. Ms. Lonero indicated that the Environmental Assessment report should place the proposed highway within the local and Regional context and should also relate to the impact of the proposal on the economy of the area. In this regard the use of local municipal comments was considered desirable.

The significance of the highway in both the local and Regional context has been reflected throughout this report. However, the prime comments in this regard are summarized in section 4.3.2 of this report where the concerns of the Regional municipalities are summarized.

Ministry of Housing

A meeting was held with Mr. R. Kennedy of the Ministry of Housing on July 13th, 1981. Mr. Kennedy indicated a number of points that are reflected throughout this report but identified that the Ministry of Housing's prime concern was with respect to the inter-relationship of the proposal with the local Official Plans.

Section 3.2.1 includes a discussion on the Regional Official Plans and section 4.3.2 deals with the municipal comments that have been received on this project.

Ministry of Natural Resources
Hamilton Region Conservation Authority
Halton Region Conservation Authority

A meeting was held on July 16th, 1981 with Mr. N. Hester of the Ministry of Natural Resources, Mr. B. Vanderbrug of the Hamilton Region Conservation Authority and Mr. J. Hall of the Halton Region Conservation Authority. In addition, the meeting was attended by Mr. I. Veitch and Mr. H. Gidamy of the Ministry of Environment.

A number of items were discussed at the meeting but the main areas of concern related to the potential impact on the future recreational usage of the Beach Strip and the potential impact on the Hamilton Harbour. In this regard, section 4.2.4 provides a discussion of the relative impacts of a bridge and tunnel crossing of the Burlington Canal and section 5 provides a discussion of the proposed development.

One area of concern that was raised by Mr. Hall was with respect to whether either the tunnel or bridge alternative, at the Burlington Canal Crossing, would better facilitate a possible future relocation of the Ontario Hydro line from the Lake Ontario side of the Beach Strip into a joint Highway/Hydro corridor. In response to this request the Ministry of Transportation and Communications met with Ontario Hydro on October 8th, 1981. At the meeting, Mr. A. Lam of Ontario Hydro indicated that Ontario Hydro had no plans for the relocation of the existing Hydro line from the Lake front. Mr. Lam further indicated, however, that if this were to be considered at some time in the future, there would be no significant difference between combining the relocated line with either the tunnel or bridge alternative of the Burlington Canal crossing.

Ministry of Agriculture and Food

Following the review of the draft of this report, the Ministry of Agriculture and Food commented that "Increasing the capacity of the Skyway will subsequently lead to pressure to widen the Q.E.W. through Niagara Regional Municipality. The existing Q.E.W. is recognized as having contributed to the loss of important tender fruit lands to development in the past. Improved access and greater volumes of traffic will inevitably lead to pressures for development at the expense of an important agricultural resource in the Niagara Peninsula".

Provincial policy has however reduced urban area boundaries within the Niagara Peninsula, for the protection of the tender fruit lands and therefore the Ministry of Transportation and Communications is not taking any additional mitigating measures as part of the proposed Queen Elizabeth Way redevelopment.

Ministry of Industry and Tourism

Following the review of the draft of this report, the Ministry of Industry and Tourism commented that access and signage would be matters for careful consideration both during and after construction. The Ministry did however indicate its support for the recommended alternative on the grounds of safety, transportation cost, work time losses and industrial growth.

4.3.2 Municipal Comments

Meetings were held with the Councils of the municipalities within which the Queen Elizabeth Way lies, on the dates identified in section 2.4.3.

The various municipal councils provided a number of comments. The main concern of all municipalities was, however, with respect to the timing of construction of a facility to provide additional freeway capacity across the Burlington Canal. All municipalities stressed the need for improvements to be made as soon as possible.

During and following the Review of the 1979 submission of the Queen Elizabeth Way Environmental Assessment to the Ministry of Environment, written comments were provided to the Ministry of Environment by the following municipalities:

Regional Municipality of Halton
Regional Municipality of Hamilton-Wentworth
Regional Municipality of Niagara
City of Burlington
City of Hamilton
Town of Stoney Creek

These written comments are included in Appendix H of this report. A summary of these comments that related to the Stage 2 and Stage 3 redevelopment of the Queen Elizabeth Way redevelopment is as follows:

Regional Municipality of Halton

- "The Halton Region Official Plan supports the redevelopment of the Queen Elizabeth Way and the Skyway Corridor".
- "The Halton Region (Transportation) Study, in considering changing travel habits, supports the Ministry of Transportation and Communications' forecasts (traffic) for this corridor".
- "The Halton Region Transportation Study identified the need for both the Stage 1 improvements and a long term solution to the capacity problems in this corridor".
- "The Business Development Department for Halton Region indicates that Halton is in the centre of a market to nearly six million Canadians, with direct links to the vast markets of the eastern seaboard of the United States. The Skyway Corridor and the Queen Elizabeth Way are recognized as important links to these market areas".
- "The Province of Ontario be strongly urged to act expeditiously to solve the existing and future road capacity problems in the Skyway Corridor".
- "A proper review of the tunnel versus bridge options in the Stage 2 improvements be carried out".

Regional Municipality of Hamilton-Wentworth

- "The Official Plan contains specific policies to encourage the Provincial Government to provide additional highway capacity between this Region and points east via the Queen Elizabeth Way/Skyway Corridor. A decision not to provide more capacity in this corridor will have a negative impact on traffic flows as well as constrain the industrial development in the Region of Hamilton-Wentworth, in the City of Hamilton and in the Town of Stoney Creek".

- "It is our opinion that this corridor is a vital link and with its existing capacity, is a constraint to the vitality of trade, commerce, industrial and tourist traffic for all of Southern Ontario".

- "In keeping with the Region's Policy on promoting Transit Usage, the Ministry of Transportation and Communications has also considered the effect of this usage and determined that there would be no significant relief to the traffic on the Skyway Corridor resulting from transit usage. Independently, the Region studying the use of transit has drawn the same conclusions through its studies".

- "The Region of Hamilton-Wentworth has recognized the Skyway and its redevelopment, as proposed by the Ministry of Transportation and Communications, as part of the Integrated Road Network and Land Use Development in this area. For example, the "Beach Strip" planning of a park in this area has recognized this transportation corridor and the Ministry of Transportation and Communications' recommendation for widening".

Regional Municipality of Niagara

- "We would suggest that the failure to provide sufficient capacity on the Burlington Bay Skyway would have a significant economic impact on the Niagara Region. It would discourage employees from other areas from establishing residences in the Niagara Region. It could have an impact on the marketing of fresh fruits and other agricultural products in the Toronto area".

- "The Regional Municipality of Niagara supports the need for the twinning of the Burlington Bay Skyway".

- "The Ministry of Environment be requested to seriously consider the implications of a delay in proceeding with the plans for such improvement".

City of Burlington

- "The City of Burlington endorses the proposal by the Ministry of Transportation and Communications to undertake major improvements to the Queen Elizabeth Way Corridor between Guelph Line and the Burlington Canal, subject to a more detailed review with particular emphasis on the financial implications of the canal crossing being a bridge or a tunnel, without causing delay to the other identified improvements to the Corridor".

- "The improvements referred to as Stage I and Stage III proceed as quickly as possible and be designed in such a manner as to accommodate the selection of the preferred option of either the bridge or the tunnel, to be carried out in conjunction with the major improvements to the total Corridor".

- "The City of Burlington register a continued preference for a tunnel in the canal crossing, as compared to a bridge".

- "The Queen Elizabeth Way structural improvements for the canal crossing, whether bridge or tunnel, in stage two be completed prior to the completion of Highway 403".

- "The Ministry of Transportation and Communications be requested to consider the removal of service on the Beach Strip Railway Spur Line as part of their improvements to the Beach Strip corridor".

City of Hamilton

The City of Hamilton formally endorsed the comments provided by the Regional Municipality of Hamilton-Wentworth.

Town of Stoney Creek

- "In the opinion of the Council of the Town of Stoney Creek the construction and improvements to the Queen Elizabeth Way as proposed by the Ministry of Transportation and Communications are deemed vital and necessary for the continued growth and development of the industrial, commercial and residential sectors of the Town of Stoney Creek".

- "The Queen Elizabeth Way Transportation Corridor provides a most important transportation link between the Town of Stoney Creek and other municipalities within the Region of Hamilton-Wentworth and the Region of Halton as well as markets in Toronto and beyond".
- "Redevelopment of this section of the Queen Elizabeth Way is vitally necessary in order to alleviate the present serious congestion of traffic, particularly on the present bridge structure".
- "It is deemed necessary that the proposed improvements be constructed as soon as possible".

4.3.3 Public Comments

Public opinions and concerns were solicited during the 1972/74 study, 1978/79 study and the 1981 reassessment of the earlier work. The prime area of public concern that was identified related to noise impacts and the selection of either a tunnel or bridge at the canal crossing. In addition a third concern was evident during the 1972/74 study. This was one of being unable to sell properties on the Beach Strip because of uncertainties with respect to government programs on the Beach Strip. This concern has now been largely resolved by the implementation of the long term property acquisition program, by the Hamilton Region Conservation Authority and the Halton Region Conservation Authority, of properties along the Beach Strip, for development as recreational lands.

The main areas of concern with respect to noise relate to two sections of the freeway. These are the sections in Burlington between Plains Road and a point south of Highway 2 and in Hamilton between the Burlington Skyway and Woodward Avenue. It is proposed to construct noise barriers in both of these locations. The construction of the barrier within Burlington is proposed as part of the approved Stage 1 construction and the barrier within Hamilton is proposed as part of the Stage 2 construction.

The second main area of public concern was the question of whether the new canal crossing should be in the form of a bridge or a tunnel.

During the 1972/74 study there had been a very strong public support for the tunnel alternative. Over 90% of the public who were polled during the study indicated a preference for the tunnel alternative. During the 1978/79 study there was once again a clear indication, at the public information centres, that the public was largely in favour of the tunnel alternative as opposed to the bridge. During the 1981 public information centres, conceptual drawings and a detailed analysis of the bridge and tunnel alternatives were available for public review. No formal poll was taken following the public review of this data but the public were provided with the opportunity to complete comment sheets. Generally only a small proportion of the public will take the time to complete these sheets and these tend to be the ones holding strong opinions. Of those that completed the comment sheets and indicated a preference for either a tunnel or bridge, 53% (9 of 17) indicated a preference for a tunnel and 47% (8 of 17) a preference for a bridge.

A number of area residents suggested that the Ministry consider the reinstitution of the Skyway tolls in order to offset the additional capital costs associated with the tunnel. In this regard the public was advised that it is Provincial policy to provide toll free highway service throughout the Province.

4.3.4 Summary of Comments

The comments of agencies and individuals external to the Ministry of Transportation and Communications fall into two categories. These relate firstly to the level of analysis of alternatives and subsequent documentation in the Environmental Assessment and secondly to the need for improved capacit
within the corridor as perceived by area residents and highway
The following table summarizes the comments that have
this section of the report:

SUMMARY TABLE OF EXTERNAL COMMENTS

AGENCY	COMMENT	ACTION
Government Reviewers in general	Need for detailed explanation of rationale for the undertaking and alternatives.	Explanation included within this report.
Ministry of Energy	Need for identification of 'load factors'.	Load factor information is limited. Several energy saving techniques are being pursued by Ministry of Transportation and Communications.
Ministry of Culture and Recreation	Need for analysis, evaluation and documentation of heritage resource data.	This data included within this report.
Ministry of Environment	Need for detailed explanation of rationale for the undertaking and alternatives as well as noise analysis.	Explanation and noise analysis included within this report.
Ministry of Treasury and Economics	Need for explanation of significance of project in local and regional context.	Explanation included within this report.
Ministry of Housing	Need for explanation of inter-relationship of project with Official Plans.	Explanation included within this report.
Ministry of Natural Resources and Conservation Authorities	Concern over impact on Harbour and Beach Strip	Harbour impacts minimized by Skyway alternative. Beach Strip impacts mitigated with noise barrier.
	Identification of quantity of required granular material	1.5 million tonnes of granular material required for Stage 2 and Stage 3
Ministry of Agriculture and Food	Concern over long term impact on tender fruit lands	Enforce land use controls
Ministry of Industry and Tourism	Supports recommended alternative.	Signage will be detailed during design
	Identifies need for adequate signage to tourist areas	
Region of Halton	Supports need for improved capacity.	Construction of Stage 2 will improve capacity.
	Requests rationale for Canal crossing alternatives	Rationale for Canal crossing alternatives included in this report.
Region of Hamilton-Wentworth	Supports need for improved capacity and proposed alternatives.	Construction of proposed undertaking will improve capacity.
Region of Niagara	Supports need for improved capacity	Construction of proposed undertaking will improve capacity.
City of Burlington	Supports need for improved capacity.	Construction of Stage 2 will improve capacity.
	Prefers tunnel alternative at Canal crossing.	Rationale for bridge alternative included within this report.
City of Hamilton	Supports need for improved capacity and proposed alternatives.	Construction of proposed undertaking will improve capacity.
Town of Stoney Creek	Supports need for improved capacity.	Construction of proposed undertaking will improve capacity.
Public	Supports need for improved capacity.	Construction of Stage 2 will improve capacity.
	Seeks reduction in noise levels.	Noise barriers proposed.
	Preference for tunnel in early 1970's somewhat tempered following review of analysis in 1981.	Rationale for Canal crossing alternatives included in this report.

RECOMMENDED ALTERNATIVE

5.1 DESCRIPTION OF RECOMMENDED ALTERNATIVE

The recommended alternative is illustrated in Appendix I at a scale of 1:5,000. The plates that are included in the Appendix illustrate both the Stage 2 and the Stage 3 redevelopment of the Queen Elizabeth Way. In addition the Stage 1 redevelopment is shown as an "existing" condition on the plates to reflect the fact that this portion of the project has already received approval.

The proposed highway will provide for three lanes in each direction in Stage 2 with provision to widen to four lanes in each direction in Stage 3. The highway will have a posted speed limit of 100 km/h.

The existing interchange with Guelph Line will be reconstructed. This has been shown as taking place in Stage 3 although its construction could physically proceed independently of the rest of the Stage 3 redevelopment. The reconstruction of the Guelph Line interchange will remove the weaving section that exists on the freeway at the present.

As part of the interchange reconstruction, the North Service Road will be relocated beyond the limits of the interchange and will pass underneath Guelph Line close to the Canadian National Railway tracks. West of Guelph Line the North Service Road will be made continuous to connect to the existing North Service Road west of Brant Street. The existing connection from the North Service Road to Plains Road will be discontinued when this extension of the North Service Road has been made. The east bound access from Plains Road to the Queen Elizabeth Way will be closed west of Guelph Line as part of the Stage 1 redevelopment of the Queen Elizabeth Way.

A new interchange will be constructed at Brant Street. This has been shown as taking place in Stage 3 although its construction could proceed independently of the rest of the Stage 3 redevelopment. Access to this interchange will be restricted to moves to and from the Queen Elizabeth Way towards Toronto and to and from Highway 403 towards Hamilton.

The Highway 403 interchange will be reconstructed including ramps to and from the proposed Highway 403 towards Toronto. Part of this interchange will be constructed during the Stage 1 Queen Elizabeth Way redevelopment. The balance of the interchange will be constructed as part of the construction of Highway 403 between Toronto and Burlington for which an exemption from the requirements of the Environmental Assessment Act has been granted. Consideration may be given to the construction of the Queen Elizabeth Way/Brant Street interchange at the time that the final section of the Highway 403 interchange is constructed.

The section of freeway between Highway 403 and Highway 2 including the Fairview Street interchange, the Highway 2 interchange and a noise barrier to the west of the freeway will all be built as part of the Stage 1 redevelopment of the freeway.

A new bridge over the Burlington Canal will be constructed as part of the Stage 2 redevelopment of the Queen Elizabeth Way. This bridge will be constructed to the west of the existing Burlington Skyway. The bridge will initially operate with three through lanes and one truck climbing lane. However, because of the technical and economical difficulties associated with widening the new Skyway at a later date it will be constructed with the ability to accommodate four through lanes and one truck climbing lane, the latter being the required cross section for Stage 3. The new bridge will accommodate Niagara bound traffic.

The existing Skyway will be modified to accommodate Toronto bound traffic. The existing deck will be reconstructed so that it can accommodate four through lanes and one truck climbing lane although it will initially operate with only three through lanes and a truck climbing lane.

Between the Skyway and Burlington Street, the Queen Elizabeth Way will be reconstructed during Stage 2, to provide a six lane cross section about the existing centre line. This construction will be carried out so that one further lane can be added in each direction at some time in the future. The Stage 2 redevelopment in this section will also include the construction of a noise barrier to the east of the Queen Elizabeth Way.

The existing Burlington Street interchange will be reconstructed to provide directional moves between the Queen Elizabeth Way and Burlington Street. This construction has been identified as being part of the Stage 3 redevelopment, but its construction can physically proceed independently of the rest of Stage 3.

Between Burlington Street, and Highway 20 the Stage 3 redevelopment of the Queen Elizabeth Way will provide for the widening of the freeway to eight lanes.

The construction of the Stage 2 redevelopment will provide a roadway that satisfies the present traffic deficiencies within the Queen Elizabeth Way corridor between Burlington and Hamilton and the Stage 3 redevelopment will provide for the flexibility to accommodate future traffic growth. This future traffic growth relates both to the through traffic demand on the Queen Elizabeth Way corridor and the growth of traffic requiring access to the local area via Guelph Line, Brant Street and Burlington Street.

The construction of the roadway will result in a number of potential environmental affects and will also resolve a number of identified problems that presently exist within the corridor. These are discussed below.

5.2 POTENTIAL ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES

The potential environmental effects of the proposed undertaking have been identified within the following categories:

- Land Use
- Community effects
- Noise
- Historical Resources
- Archaeological Resources
- Aesthetics
- Agriculture
- Water
- Air
- Vegetation
- Wildlife
- Environmentally Sensitive Areas

5.2.1 Land Use

The existing and proposed land uses within the corridor were discussed in section 3.2.2 of this report. The potential impacts on the adjacent existing land uses are primarily those of noise which is discussed in section 5.2.3, community effects which are discussed in section 5.2.2 and accessibility which is discussed in section 5.3.6.

Across the Beach Strip the Waterfront plans for the Regions of Halton and Hamilton-Wentworth call for the redevelopment of the area from residential to recreational land use. The effects of the twinning of the Skyway will result in some minor noise level increases of up to 5 dBA in the vicinity of the Burlington Canal. However, this will be offset by the relocation of the existing arterial roadway to the west of the Queen Elizabeth Way and the construction of noise barriers adjacent to the at grade section of the Queen Elizabeth Way across the Beach Strip. These measures will result in noise level decreases of up to 10 dBA in locations on the Beach Strip that are not adjacent to the Skyway. The effect of these noise level changes on the future recreational use of the Beach Strip can not be specifically defined as the individual recreational uses have not yet been identified. It is, however, proposed that the Beach Strip be developed for a variety of intensive and active types of recreational uses rather than for passive uses.

The relocation of the existing arterial roadway to the west of the Queen Elizabeth Way will permit the redevelopment of the Beach Strip to proceed as an integral block of land without the severance created by a through roadway. The retention of the existing lift bridge will also allow for interaction between the recreational uses on the Halton and Hamilton-Wentworth side of the Burlington Canal.

5.2.2 Community Effects

The proposed construction will require the acquisition of property from a number of public and private owners throughout the corridor.

Within Burlington much of the land that is to be acquired is from lands that are being developed and much of the required property has already been set aside in subdivision plans. This applies particularly between Highway 2 and Plains Road/Fairview Street which is part of the approved Stage 1. Consequently there will be no significant impact on the identified communities within Burlington.

The only area where there are residential properties to be acquired is within Hamilton, on the east side of the Queen Elizabeth Way across the Beach Strip. In this area the Hamilton Region Conservation Authority has been acquiring properties since 1974. This acquisition program is intended to result in the eventual public ownership of all properties across the Beach Strip and the development of the lands for recreational purposes. The Conservation Authority's acquisition program does not include properties within the identified property requirements for the Queen Elizabeth Way. In this regard the Ministry of Transportation and Communications will need to acquire 20 homes between Woodward Avenue and the Skyway to allow the construction associated with the Stage 2 development to take place. Following the detailed design of the highway and the exact definition of the property requirements, it may be possible to transfer the ownership of some properties between the Ministry of Transportation and Communications and the Hamilton Region Conservation Authority.

The Ministry of Transportation and Communications proposed purchases will result in an impact on the community in that the number of residential properties will be decreased. However, the proposed takings result in a change of an existing community boundary rather than the separation or isolation of any part of the community.

The Stage 1 and Stage 2 improvements to the corridor will significantly reduce the traffic on Beach Boulevard, the main arterial which bisects the community, and therefore will enhance the local residential nature of the area. No specific mitigation measures are proposed other than the construction of a noise barrier as part of the Stage 2 redevelopment.

5.2.3 Noise

Noise levels on the Queen Elizabeth Way will increase over time as traffic volumes increase. However, proposed mitigation measures such as noise barriers will result in reductions from the present noise levels in those areas of residential development where the existing noise levels are particularly high.

An identification of the benefits associated with the implementation of noise barriers was discussed in section 3.2.4. Specifically it is proposed to construct a barrier adjacent to the east side of the freeway from Burlington Street to the south end of the Skyway. In addition the approved Stage 1 redevelopment will include the construction of a barrier on the west side of the freeway from north of the Skyway to Fairview Street.

The total noise level changes associated with the Stage 1, 2 and 3 redevelopment of the Queen Elizabeth Way will be as follows:

Noise level change in dBA	Number of houses subject to noise level change (1980-2001)
10+	0
(5-10)	0
(0-5)	108
(0-5)	596
(5-10)	77
10+	0

5.2.4 Historical Resources

The Queen Elizabeth Way redevelopment will most notably result in the removal of homes and vegetation located in the vicinity of the Beach Strip. It is of note that the stone pumping station and the light house, both of which were identified as being important historical resources in the Ministry of Transportation and Communications' report "An Investigation of Historical Resources", will not be affected by the Stage 2 or Stage 3 redevelopment of the Queen Elizabeth Way.

The Ministry of Transportation and Communications' report "An Investigation of Historical Resources" details the specific impacts within the corridor but in summary they are as follows:

Property requirements for the Queen Elizabeth Way along the Beach Strip will require the removal of approximately 25 houses (5 of which are presently owned by the Ministry of Transportation and Communications) and several garages and sheds (which may or may not accompany these houses). It may, however, be possible to reduce this number when the detailed design of the roadway is finalized. In addition the Ministry of Transportation and Communications' vacant toll administration building may be removed. Vegetation located in the backyards of houses located on the Beach Strip and along the Queen Elizabeth Way right-of-way will also be removed. Removals may tend to reduce the aesthetic quality of the residential area and of the long term recreational use of the area.

The Hamilton and Burlington Beach Strip represents a unique residential and recreational area on Lake Ontario. The houses scheduled for removal on the Beach Strip are characteristic of the kinds of houses found on the Strip. At the same time, there are other houses located on the same streets and on Beach Boulevard which were built in the same era and which are of similar construction to those houses which are potentially affected. It may be noted that of the ten houses on the Beach Strip which were listed in 1980, by the City of Hamilton Local Architectural Conservation Advisory Committee (L.A.C.A.C.), on the basis of their architectural style, none of these are expected to be directly affected by the Queen Elizabeth Way redevelopment, with the exception of a frame shed located at the rear of one of these houses, 924 Beach Boulevard which will be required to be removed as part of Stage 1.

The Burlington Historical Society, Burlington L.A.C.A.C., the Head-of-the-Lake Society and the Hamilton L.A.C.A.C. have been informed of the potential building removals in the vicinity of the highway development.

The City of Hamilton L.A.C.A.C. in a letter dated July 24, 1980, stated that "no heritage properties of interest or within their jurisdiction are in the study district".

The Burlington L.A.C.A.C. replied in a letter dated October 27, 1980, that "neither the proposed Queen Elizabeth Way redevelopment (nor the proposed alignment of Highway 403) will place any historical structures or sights (sic) in jeopardy." The Burlington L.A.C.A.C., in light of the potential building removals, was given the opportunity to visit sites where structures will be removed by the Ministry of Transportation and Communications for the purpose of salvage work or recording. This offer was declined. The respective L.A.C.A.C.'s have indicated that they do not consider that any action is necessary in regard to structures to be affected by the highway development.

In view of all these considerations, no action other than the proposed landscaping is recommended on the part of the Ministry of Transportation and Communications.

5.2.5 Archaeological Resources

No archaeological resources were identified within the corridor, that would be affected by the Stage 2 and Stage 3 redevelopment of the Queen Elizabeth Way. Consequently, no mitigation measures are proposed in this regard.

5.2.6 Aesthetics

The proposed roadway will be developed to be as aesthetically pleasing as possible.

Landscaping will be incorporated into the construction of the roadway as discussed in section 5.2.10, in order to mitigate the visual aspects of the highway within the community.

The proposed Skyway will be designed as illustrated in figure 14. The comparatively slim lines of this structure reflect the state of the art of bridge design as well as providing an aesthetically pleasing appearance to the bridge.

5.2.7 Agriculture

The Ministry of Agriculture and Food has commented that the widening of the Q.E.W. could eventually lead to increased development pressures on the tender fruit lands in the Niagara Peninsula. Provincial policy has however reduced urban area boundaries within the Niagara Peninsula for the protection of the tender fruit lands and therefore the Ministry of Transportation and Communications is not taking any additional mitigating measures as part of the proposed Queen Elizabeth Way redevelopment.

5.2.8 Water

The identified water resources located within the corridor include the Rambo, Hager, Indian and Red Hill Creeks as well as the Hamilton Harbour and Lake Ontario.

There will be no impact on the Rambo, Hager and Indian Creeks as part of the Stage 2 and Stage 3 redevelopment. All of the work associated with these crossings will be carried out during Stage 1 and the Highway 403 works.

The construction of the proposed Burlington Street interchange as part of the Stage 3 redevelopment will require three new structures over the Red Hill Creek. No relocation of the creek is proposed, nor will the approach roadway fill extend into the creek. At the time of detailed design, it may or may not be found necessary to locate a pier within the creek. If this is necessary, the pier construction will be designed to minimize impacts on the creek. Also at the time of design the bridge openings will be designed to handle the anticipated storm flows in the Redhill Creek. The Hamilton Region Conservation Authority has indicated that the Queen Elizabeth Way presently acts as a spillway under Regional storm conditions and that changes to the freeway could alter this. However, the proposed Queen Elizabeth Way construction in this area will not alter the existing grade. On the basis of these considerations only minimal impacts are anticipated on the Red Hill Creek. It is proposed that construction take place in accordance with the Ministry of Transportation and Communications Class Environmental Assessment document for a B5 project (New or Modified Roadway Water Crossings). A copy of this document can be reviewed within the offices of the Ministry of Transportation and Communications.

The main water quality effects of the Queen Elizabeth Way redevelopment relate to the filling within the Hamilton Harbour. This filling will primarily take place as part of the Stage 1 redevelopment because the Stage 1 arterial alignment, as approved, was established so that it can accommodate the Stage 2 construction, although there will be some minor fill requirements under the proposed structure in Stage 2 (approximately 0.5 ha). However, as the amount of fill that would be required in Stage 1 is a function of the method of constructing the Burlington Canal Crossing, it is discussed briefly here.

The filling within the Hamilton Harbour will result in a loss of water surface area of approximately 10 ha (0.5% of total area) and the displacement of approximately 150,000 m³ (0.05% of total volume) of water. The significance of this is that the Harbour acts as a retention pond to filter pollutants before the Harbour waters are discharged into Lake Ontario via the Burlington Canal. The loss of surface area is of significance in terms of reducing the aeration capabilities of the Harbour and the loss of volume is of significance in terms of reducing the retention time within the Harbour. The effects of these reductions have been identified as "minor" by the Ministry of Environment although the Hamilton Region Conservation Authority has expressed concerns over cumulative effects.

During the 1979 study, the Ministry of Environment's Water Resources Assessment Section had been requested to analyze the impacts of the roadway fill on the water quality within the Harbour. The Ministry of Environment indicated that filling on such a small scale as that proposed would not be discernible on the Ministry's model. However, in order to mitigate the impact of the fill on the Harbour, only hydraulically acceptable material will be used for the fill. In this regard, the use of material dredged from the Harbour, is being considered for the construction of the Stage 1 fill area. This will partially mitigate the loss of retention time that would be brought about by the loss of water volume within the Harbour.

The construction of the proposed undertaking will have no direct effects on Lake Ontario although there will be a very minor (unquantifiable) indirect effect resulting from the placement of fill within the Hamilton Harbour.

5.2.9 Air

The construction of the proposed undertaking will result in a free flow traffic condition on the highway. This will reduce the frequency of slow downs, stoppages and idling vehicles. This in turn is expected to reduce the level of emissions from the highway although no formal modelling of the level of air pollutants from the highway has been carried out as part of this study.

5.2.10 Vegetation

Over the majority of the project, very few tree removals will be required. However, the section of the redevelopment between Burlington Street and the south end of the Skyway will result in fairly extensive removals of vegetation associated with the gardens of former houses to the east of the Queen Elizabeth Way. This will amount to approximately 1.5 ha.

The Ministry of Transportation and Communications' Landscape Planning and Operations Section has carried out an on site analysis of vegetation in the corridor in order to identify where special efforts should be made to retain existing tree growth through the use of special contract provisions.

In order to mitigate the loss of vegetation within the corridor, landscaping, using nursery grade trees and shrubs, particularly salt tolerant species, will be included in post construction landscape contracts to complement retained growth, to improve roadway aesthetics, and to better integrate the right-of-way corridor with the adjacent landscapes. Land within the right-of-way will be landscaped to an urban freeway standard, the highest level of landscaping carried out by the Ministry. These areas include all interchanges and all berm areas.

Landscape plans for Stage 1, which are typical of Stage 2 and Stage 3 may be viewed in the Ministry of Transportation & Communications Regional Office.

5.2.11 Wildlife

The corridor is primarily urban and consequently there is little wildlife present. The exception to this is in the identified environmentally sensitive areas. (These are discussed in section 5.2.12). The only environmentally sensitive area affected by either the Stage 2 or Stage 3 redevelopment is the Redhill Creek Marsh-Van Wagner's Marsh Environmentally Sensitive Area. In this area it has been reported that a variety of turtles (painted, snapping, musk, eastern spiny softshell, map and Blanding's) may possibly still occur. In addition, the area was identified as possibly being an important congregation site for red bats during migration. The dominant wildlife within the environmentally sensitive area is, however, in the form of birds.

Although there is limited wildlife within the overall corridor, the area of the Redhill Creek Marsh-Van Wagner's Marsh will be inventoried in detail to confirm the identified species that are present and mitigation measures required at a time closer to construction in this area (Stage 3).

In order to minimize the impacts, the construction will take place in accordance with the Class Environmental Assessment B-5, together with whatever steps can be reasonably taken to mitigate the impacts that may occur due to conflicts with the critical spring nesting periods of any rare bird species.

5.2.12 Environmentally Sensitive Areas

Three Environmentally Sensitive Areas were discussed in section 3.1.6. These were the Hydro Islands, the Tollgate Ponds and the Redhill Creek Marsh - Van Wagner's Marsh.

Of these three, only the Redhill Creek Marsh - Van Wagner's Marsh is affected by the redevelopment of the Queen Elizabeth Way and this is restricted to the Stage 3 redevelopment of the Burlington Street interchange and the widening of the Queen Elizabeth Way from six to eight lanes between Burlington Street and Highway 20.

The construction of the Burlington Street interchange will require three crossings of the Redhill Creek as discussed in section 5.2.8 and these crossings will be carried out in accordance with the Class Environmental Assessment document B-5.

The widening of the Queen Elizabeth Way from six to eight lanes, between Highway 20 and Burlington Street, will take place symmetrically about the existing centre line of the highway and consequently the impacts on the Marsh, will be restricted to a 3.75 m widening of the roadway on either side of the existing freeway. This will amount to a filling of approximately 0.3 ha of the 30 ha marsh (1%) in an area where highway activities presently exist, therefore the impacts associated with this widening are expected to be minor.

5.3 BENEFITS DERIVED FROM THE UNDERTAKING

The benefits that the undertaking will provide have previously been identified as being solutions to problems within the corridor. These were identified as falling within the following categories:

- Slow Downs and Stoppages
- Accident Rates
- Skyway Maintenance
- Future Traffic
- Official Plans

In addition the effects on industry, trade and commerce have been identified as a benefit.

5.3.1 Slow Downs and Stoppages

The proposed Stage 2 redevelopment of the Queen Elizabeth Way will provide improved capacity between Highway 2 and Burlington Street.

This will result in the virtual elimination of slow downs and stoppages on the existing highway due to the traffic demand exceeding the capacity of the roadway. The reduction in slow downs will cause a saving both in vehicle operating costs, and in time for people driving this section of the freeway. Overall long term discounted cost savings were calculated for the entire section of highway with a vehicle operating cost saving of $7.5 million and a time cost saving of $81 million.

5.3.2 Accident Rates

There is little documentation of research on the effects, on accident rates, of improving the level of service on a section of roadway with unusual characteristics such as those on the Burlington Skyway although some conclusions can be drawn from reviewing the historical accidents rates on the existing Skyway as discussed in section 4.2.4.

However, the existing Skyway provides two lanes in each direction whereas the Stage 2 development will provide three through lanes plus a truck climbing lane in each direction and the Stage 3 development will increase this to four through lanes plus a truck climbing lane in each direction. It is anticipated that this will have the effect of reducing accidents from approximately double the Provincial freeway average to the Provincial freeway average. This will result in a reduction of approximately 60+ accidents per year on the Skyway alone.

The additional lanes will provide for a more gradual speed differential across the lanes rather than having one very slow and one fast lane. The additional bridge deck width should also make it possible to accommodate trucks during adverse weather conditions, except for extremely windy days without risk of side swipes due to buffeting from the wind. During extremely windy periods, the arterial emergency routing will be put into operation.

5.3.3 Skyway Maintenance

Through staging of the construction of the Stage 2 redevelopment of the Queen Elizabeth Way, it will be possible to divert traffic from the existing Skyway so that the required maintenance of the existing Skyway can take place. This will have the significant benefit of allowing for the continued movement of people and goods across the corridor and eliminate the need to close the facility for a complete summer season (6 months approximately) affecting approximately 7,000,000 vehicle trips.

5.3.4 Future Traffic

The proposed Stage 3 redevelopment of the Queen Elizabeth Way will allow for the flexibility to accommodate future traffic demands. This would avoid a repetition of the extremely poor level of service and attendant slow downs, stoppages and accidents that occur on the present Queen Elizabeth Way. This future demand will also be accommodated with minimal impacts.

5.3.5 Official Plans

The affected municipalities were unanimous in their support of the proposed capacity improvements as part of their respective Official Plans. This reflected their need to have adequate transportation service to permit the orderly development of their communities and for the benefit of both their existing and future economies. The individual comments of the affected municipalities are included within Appendix H of this report.

5.3.6 Industry, Trade and Commerce

The construction of the roadway will improve the level of service and accessibility for industry and commerce within the study area as well eliminating a constraint to the movement of commercial vehicles within Southern Ontario.

The Ministry of Industry and Tourism has indicated the following benefits for the recommended alternative:

> "Safety - The growing volume of traffic and the resulting congestion have increased the safety risk for tourists and locally employed personnel.
>
> Transportation Cost - There are increased fuel costs for trucks and passenger vehicles due to traffic stoppages and congestion on the Burlington Skyway Bridge.
>
> Work Time Losses - Congestion on this stretch of the Q.E.W. is recognized as the cause of late reporting to work on the part of persons employed in the area, resulting in lost production and executive time.

> Industrial Growth - Bottlenecks and delays on the Burlington Skyway Bridge are perceived as a deterrent to industrial growth in the surrounding region."

All impacts on industry, trade and commerce at the local level have been identified as positive and, therefore, no mitigation measures are proposed other than to ensure adequate signing during and after construction.

5.4 SUMMARY OF IMPACTS AND BENEFITS

The Queen Elizabeth Way reconstruction will result in a number of impacts as discussed in section 5.2. The recommended mitigation measures associated with these impacts are also discussed in section 5.2.

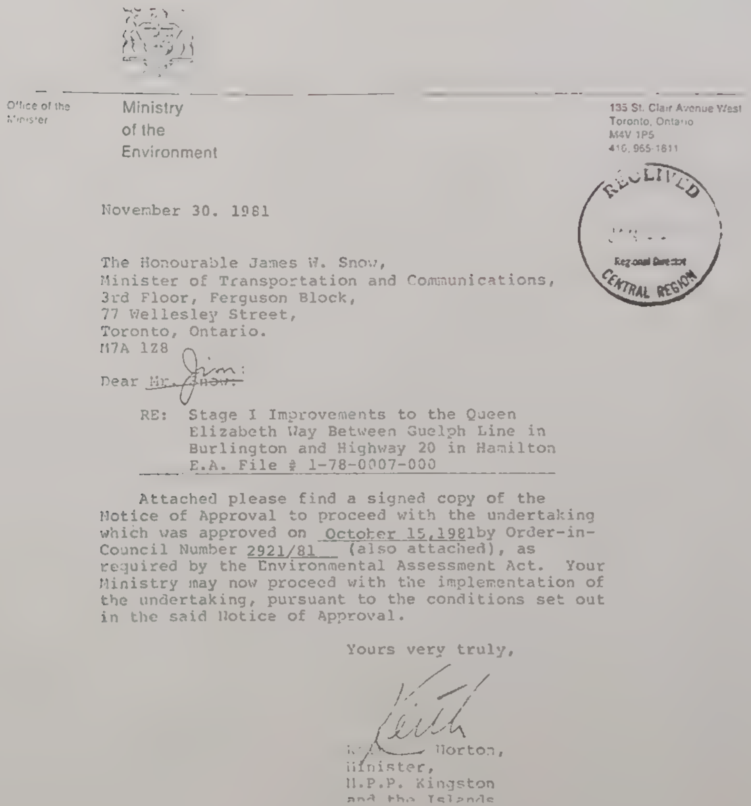
The main impacts associated with the proposed undertaking are those associated with filling within the Harbour, noise and impacts on the existing residential and possible future recreational land uses on the Beach Strip.

The benefits associated with the proposed undertaking are discussed in section 5.3. These benefits include reductions in slow-downs, stoppages and accidents for commuter traffic, long distance and truck traffic.

The proposed undertaking will allow for the orderly development of the area municipalities in accordance with their Official Plans as well as providing for the maintenance of the existing Skyway and making accommodation to handle future traffic volumes.

On the basis of the benefits that will accrue as a result of the reconstruction of the Queen Elizabeth Way, the Ministry of Transportation and Communications believes that these more than outweigh the disbenefits associated with the construction. This viewpoint has been also expressed by the Councils of the Regional Municipalities of Niagara, Hamilton-Wentworth and Halton. The Ministry of Transportation and Communications is therefore requesting approval for the planning, design, construction, operation and maintenance of the Stage 2 redevelopment of the Queen Elizabeth Way as described in section 5.1 and as illustrated in Appendix I. In addition the Ministry of Transportation and Communications is requesting planning approval, i.e. approval to designate and to protect/acquire property, for the Stage 3 redevelopment of the Queen Elizabeth Way.

APPENDIX A – Order in Council : Stage 1 Approval



Office of the Minister

Ministry
of the
Environment

135 St. Clair Avenue West
Toronto, Ontario
M4V 1P5
416/965-1611

RECEIVED
Regional Director
CENTRAL REGION

November 30. 1981

The Honourable James W. Snow,
Minister of Transportation and Communications,
3rd Floor, Ferguson Block,
77 Wellesley Street,
Toronto, Ontario.
M7A 1Z8

Dear ~~Mr. Snow:~~ Jim:

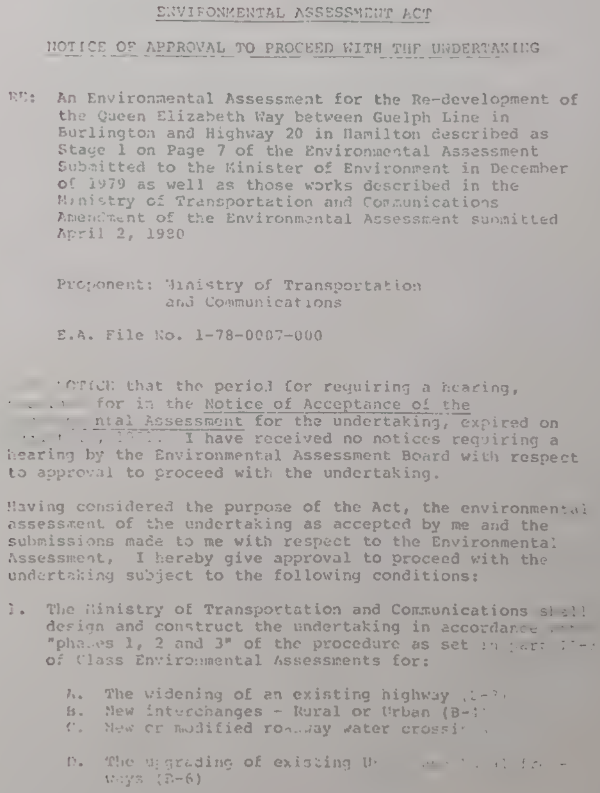
RE: Stage I Improvements to the Queen Elizabeth Way Between Guelph Line in Burlington and Highway 20 in Hamilton
E.A. File # 1-78-0007-000

Attached please find a signed copy of the Notice of Approval to proceed with the undertaking which was approved on October 15,1981 by Order-in-Council Number 2921/81 (also attached), as required by the Environmental Assessment Act. Your Ministry may now proceed with the implementation of the undertaking, pursuant to the conditions set out in the said Notice of Approval.

Yours very truly,

Keith

K.[illegible] Norton,
Minister,
M.P.P. Kingston
and the Islands



ENVIRONMENTAL ASSESSMENT ACT

NOTICE OF APPROVAL TO PROCEED WITH THE UNDERTAKING

RE: An Environmental Assessment for the Re-development of the Queen Elizabeth Way between Guelph Line in Burlington and Highway 20 in Hamilton described as Stage 1 on Page 7 of the Environmental Assessment Submitted to the Minister of Environment in December of 1979 as well as those works described in the Ministry of Transportation and Communications Amendment of the Environmental Assessment submitted April 2, 1980

Proponent: Ministry of Transportation
and Communications

E.A. File No. 1-78-0007-000

[illegible] NOTICE that the period for requiring a hearing, [illegible] for in the Notice of Acceptance of the [illegible]ntal Assessment for the undertaking, expired on [illegible]. I have received no notices requiring a hearing by the Environmental Assessment Board with respect to approval to proceed with the undertaking.

Having considered the purpose of the Act, the environmental assessment of the undertaking as accepted by me and the submissions made to me with respect to the Environmental Assessment, I hereby give approval to proceed with the undertaking subject to the following conditions:

1. The Ministry of Transportation and Communications shall design and construct the undertaking in accordance [illegible] "phases 1, 2 and 3" of the procedure as set in [illegible] of Class Environmental Assessments for:

   A. The widening of an existing highway [illegible]
   B. New interchanges - Rural or Urban (B-[illegible]
   C. New or modified roadway water crossi[illegible]

   D. The upgrading of existing U[illegible] ways (B-6)

APPENDIX A – Order in Council : Stage 1 Approval

which environmental assessments were accepted under the Act and the undertakings approved by Notice dated March 5, 1980.

2. In addition to the procedure specified in condition number 1 above, the Ministry of Transportation and Communications shall consult with:

    1. Those persons, public bodies and organizations set out on pages i and ii of the review.
    2. Ontario Hydro
    3. Public Works Canada
    4. Transport Canada
    5. Canada Centre for Inland Waters
    6. Hamilton Harbour Commission
    7. Canadian National Railways
    8. Regional Municipality of Halton
    9. Regional Municipality of Hamilton-Wentworth
    10. City of Burlington
    11. City of Hamilton
    12. Affected Property Owners

3. The Ministry of Transportation and Communications shall prepare a report(s) in accordance with the outline for chapter 5 of environmental study reports set out in the class environmental assessments referred to in condition number 1 and at least 30 days prior to the letting of contracts for the construction of the undertaking shall make that report(s) available to those parties listed in condition 2.

4. The proponent shall comply with all of the provisions of the environmental assessment as amended by the proponent and accepted except to the extent such provisions are in conflict with any of the previous conditions, all of which provisions are incorporated herein.

REASONS:

The reasons for giving approval are:

(1) I [illegible] ice requiring a hearing by the Envi[illegible]ssment Board after giving either the [illegible] this undertaking [illegible]

(2) The purpose of the Environmental Assessment Act, which is the betterment of the people of the whole or any part of Ontario by providing for the protection, conservation and wise management in Ontario of the environment will be sufficiently fulfilled if the undertaking is carried out in accordance with the conditions set out above.

Dated at Toronto the 15 of October , 1981.

Minister of the Environment
135 St. Clair Avenue West
14th Floor
Toronto, Ontario M4V 1P5

Approved by

O.C. No. 2921/81

APPENDIX B – Listing of Available Material

The following material is available for examination by appointment at the offices of the Ministry of Transportation and Communications by contacting:

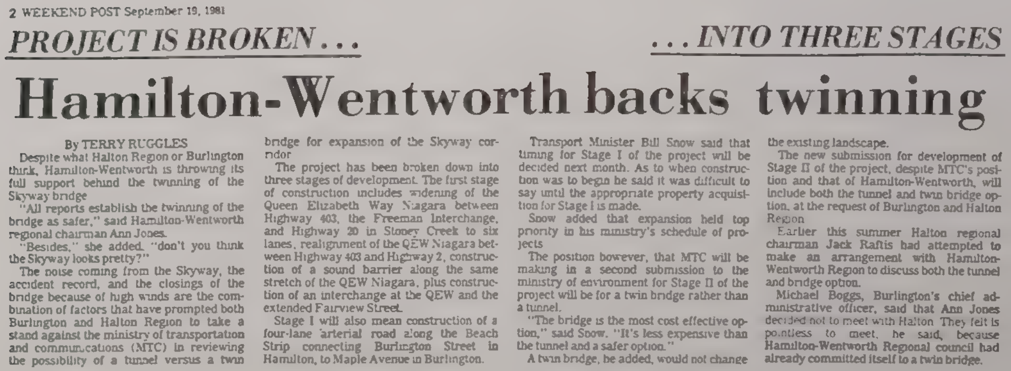
Mr. Paul Askie, P. Eng.
Senior Project Manager
Planning and Design Section
Central Region
Ministry of Transportation and Communications
5000 Yonge Street
Willowdale, Ontario
M2N 6E9
Telephone No. 224-7600

Ms. Joan O'Mara
Environmental Planner
Planning and Design Section
Central Region
Ministry of Transportation and Communications
5000 Yonge Street
Willowdale, Ontario
M2N 6E9
Telephone No. 224-7657

- Q.E.W. Feasibility Study - Ministry of Transportation and Communications, 1975
- Q.E.W. Environmental Assessment Report Type I - Ministry of Transportation and Communications November, 1979
- Future Perspective, Provincial Highways 1981-2001 Ministry of Transportation and Communications, 1981
- Town of Burlington, Traffic Planning Report, 1965-1985
- Halton Region Transportation Study - Region of Halton, 1977
- Hamilton Transportation Strategy Study - City of Hamilton, 1973
- Burlington Street, Functional Design Report Region of Hamilton-Wentworth, 1978
- Inter Regional Bus Transit Study, Oakville to Hamilton Ministry of Transportation and Communications, 1978
- Halton-Wentworth Waterfront Study - 1974
- Halton Waterfront Plan - Region of Halton, May 1981
- Feasibility Study; Bridges vs. Tunnels - Ministry of Transportation and Communications, January 1973
- Supplementary Feasibility Study - Proposed Tunnel under Burlington Canal, Ministry of Transportation and Communications, 1979
- Noise level calculations by Ministry of Transportation and Communications
- Traffic turning volumes by Ministry of Transportation and Communications
- Vegetation Survey by Ministry of Transportation and Communications
- Landscape plans by Ministry of Transportation and Communications
- An Investigation of Historical Resources, Queen Elizabeth Way, Guelph Line to Highway 20, Ministry of Transportation and Communications, March, 1981
- Archaeological Survey and Heritage Resource Assessment - Queen Elizabeth Way, Burlington/Hamilton Section, Highway 20 to Guelph Line, Ministry of Transportation and Communications, 1981
- Road User Benefit Calculation Package - Manual, Priority Development Branch, Ministry of Transportation and Communications Volumes 1 and 2, October 1976
- Computer print out from calculations made from "Road User Benefit Calculation Package" (See above)
- Input Data for Calculation of Vehicle Operating Costs and Travel Time Data, Specific Studies Group, Systems Planning Branch, Ministry of Transportation and Communications, August 1973 (This is supplemented annually by a technical memo "User Benefit Cost Parameter Update")
- Ministry of Transportation and Communications, Class Environmental Assessment Document B5 (New or modified roadway water crossings)

APPENDIX C – Glossary

Accident Rate:	This is the number of accidents that occur for each million vehicle kilometres of travel.
A.A.D.T.:	Annual Average Daily Traffic is the average twenty four hour, two-way traffic for the period from January 1st to December 31st.
A.D.T.:	Average Daily Traffic is the twenty four hour, two way daily traffic for a specified period of time.
Capacity:	The maximum theoretical volume of traffic that can be handled by a roadway - see section 3.3.7
Directional Split:	This is the proportion of traffic travelling in opposing directions on a highway.
Green Time:	The period of time when traffic signals are green as opposed to red or amber.
L.A.C.A.C.:	Local Architectural Conservation Advisory Committee
Long Term Discounted User Benefits:	Refer to section 4.2.4 for explanation.
Peak Hour:	That hour(s) of the week when the highest traffic volume occurs.
S.A.D.T.:	Summer Average Daily Traffic is the average twenty four hour, two-way traffic for the period from July 1st to August 31st.
T.E.M.P.:	Transportation Energy Management Program
W.A.D.T.:	Winter Average Daily Traffic is the average, twenty four hour, two way traffic for the period from December 1st to March 31st.
Weaving Section:	A section of the roadway where traffic entering the highway crosses the path of traffic that is exiting.



2 WEEKEND POST September 19, 1981

PROJECT IS BROKEN . . . *. . . INTO THREE STAGES*

Hamilton-Wentworth backs twinning

By TERRY RUGGLES

Despite what Halton Region or Burlington think, Hamilton-Wentworth is throwing its full support behind the twinning of the Skyway bridge

"All reports establish the twinning of the bridge as safer," said Hamilton-Wentworth regional chairman Ann Jones.

"Besides," she added. "don't you think the Skyway looks pretty?"

The noise coming from the Skyway, the accident record, and the closings of the bridge because of high winds are the combination of factors that have prompted both Burlington and Halton Region to take a stand against the ministry of transportation and communications (MTC) in reviewing the possibility of a tunnel versus a twin bridge for expansion of the Skyway corridor

The project has been broken down into three stages of development. The first stage of construction includes widening of the Queen Elizabeth Way Niagara between Highway 403, the Freeman Interchange, and Highway 20 in Stoney Creek to six lanes, realignment of the QEW Niagara between Highway 403 and Highway 2, construction of a sound barrier along the same stretch of the QEW Niagara, plus construction of an interchange at the QEW and the extended Fairview Street.

Stage I will also mean construction of a four-lane 'arterial road along the Beach Strip connecting Burlington Street in Hamilton, to Maple Avenue in Burlington.

Transport Minister Bill Snow said that timing for Stage I of the project will be decided next month. As to when construction was to begin he said it was difficult to say until the appropriate property acquisition for Stage I is made.

Snow added that expansion held top priority in his ministry's schedule of projects

The position however, that MTC will be making in a second submission to the ministry of environment for Stage II of the project will be for a twin bridge rather than a tunnel.

"The bridge is the most cost effective option," said Snow. "It's less expensive than the tunnel and a safer option."

A twin bridge, he added, would not change the existing landscape.

The new submission for development of Stage II of the project, despite MTC's position and that of Hamilton-Wentworth, will include both the tunnel and twin bridge option, at the request of Burlington and Halton Region

Earlier this summer Halton regional chairman Jack Raftis had attempted to make an arrangement with Hamilton-Wentworth Region to discuss both the tunnel and bridge option.

Michael Boggs, Burlington's chief administrative officer, said that Ann Jones decided not to meet with Halton. They felt is pointless to meet, he said, because Hamilton-Wentworth Regional council had already committed itself to a twin bridge.

APPENDIX D — News Media Coverage

The Spectator, Burlington, Tuesday, September 22, 1981 7

Province 'dumps on' tunnel hopes

By PETER VAN HARTEN
Spectator Staff

BURLINGTON — A canal tunnel would not only be more expensive but would also have a number of undesirable social and environmental effects, a city committee heard yesterday.

"They absolutely dumped on us," said Alderman Jack Cowman, public works committee chairman, yesterday after the ministry of transportation and communications outlined a cost and benefit analysis of Burlington's hopes for a tunnel

Burlington has been pressing for a tunnel instead of a twin Skyway bridge to solve the traffic headaches of the current bottleneck over the canal

However, in their presentation yesterday, provincial planners told the city committee they would be asking in late October for environmental approval of a bridge and not a tunnel. The planners presented the same information yesterday to Hamilton's transport and environment committee

"And it's going to be hard to fight," said Mr. Cowman

He pointed out the MTC had hit the committee with the extra costs, extra bridges required for the new arterial road, extra fill and worse water quality that are features of a tunnel

Noise factors

The committee has asked the city's staff to study the province's figures

At the meeting, John Sutherns, a private cosultant acting for the province, told the committee noise factors and operating costs clearly favored the tunnel

"But it's not all one sided," said Mr. Sutherns, who added the enviromental factors clearly favored the skyway twinning

Double the land area would be needed for a tunnel and that would mean filling the Hamilton harbor That would have a negative impact on water quality, he said

And although an earlier estimate suggested there would be a $20 million operating cost saving for tunnels rather than bridges, the ministry had now revised that estimate to $6 million, said senior ministry project manager Paul Askie.

In their presentation, the planners outlined four proposals — a twin bridge at a cost of $27 4 million, a tunnel with no expansion capacity for $42.1 million, a tunnel with expanion capacity for $45 8 million and twin tunnels with the skyway removed at $57.9 million

All figures are long-term discounted dollar figures rather than total 1981 dollars and figures for the tunnel are the lower cost for the current shallow water channel depth rather than the deeper depth the Hamilton Harbor Commission is likely to insist on

In 1981 dollars, the figures worked out to $38 million for a twin bridge, $58 5 million for a tunnel with no expansion capabilities, $63 5 for an expandable tunnel and $81 6 million for twin tunnels with the skyway removed.

The province estimates an accident cost saving of $2 3 million for the twin bridge and a saving of $2 5 million for the current bridge with a tunnel.

The first stage includes a new arterial road on the Beach Strip, partial reconstruction of the QEW to six lanes and interchange modifications

The committee was told the second stage, which is a bridge or tunnel, would not begin until 1983 if environmental approval is obtained without a hearing

The work would not be complete until the late 1980s

The MTC plans to have public meetings to outline the proposals Sept 29 at the Burlington Central Library from 2 to 5 p.m. and from 7 to 9.30 p.m. and at the same times at Woodward Avenue Public School in Hamilton on Sept 30.

The Spectator, Burlington, Friday, September 25, 1981

Skyway bridge unsafe - Raftis

By AL MacRURY
Spectator Staff

THE BURLINGTON Bay Skyway Bridge is unsafe and should be replaced by a tunnel, Halton region's chairman has warned the ministry of transportation and communications.

Provincial officials don't seem to be getting the message the public is trying to tell them, Jack Raftis says

"The bridge is very narrow. It's very steep It gets very windy up there We get ice up there. The bridge is unsafe."

Despite Halton region's concerns, however, the MTC intends to seek environmental approval for a twinning of the existing bridge. Constructing a tunnel under the Burlington Bay is far too costly, the province maintains

JACK RAFTIS
Favors tunnel

Upgrading

Paul Askie, MTC project manager, says up to $7 million will be spent upgrading the existing bridge in an effort to alleviate public fears and make it safer.

Hamilton-Wentworth regional council has approved the twinning

Once the new bridge is built, the median will be removed from the existing Skyway, leaving three northbound passenger car lanes and one truck lane

The new bridge would carry an equal number of lanes of Niagara-bound vehicles

"Trucks slowing down to go up the bridge create a great speed differential and obvious problems," Mr. Askie admitted. "We hope to remove the median, add a truck lane and obtain much improved conditions"

An open house meeting outlining the MTC's plans — which is being held at the Burlington library Tuesday — has provoked some controversy of its own

Halton's chief administrative officer asked if the province had talked to local municipalities before setting the date of the meeting

The region has organized a special public meeting of its own for the same evening

The regional meeting will give the public a chance to discuss a recent report suggesting day care facilities in Halton require major improvements

"It's an unfortunate conflict," Oakville Councillor Ann Mulvale said

A MTC consultant said the ministry has ruled out the tunnel option favored by Burlington and Halton councils because of the cost involved

While a twinning of the bridge is expected to cost $38 million, a tunnel could cost as much as $72.8 million

In addition, a tunnel would be technically harder to construct

The Hamilton Harbor Commission has indicated it wants a draft of 35 feet (11 metres) to enable ships to safely travel in and out of the harbor.

By the time you add on the height of the tunnel itself, the thickness of its walls and a five-foot thick (1.7 metre) layer of protective gravel placed above it, you need to dig 60 feet (18 metres) below the surface of the water, the MTC says.

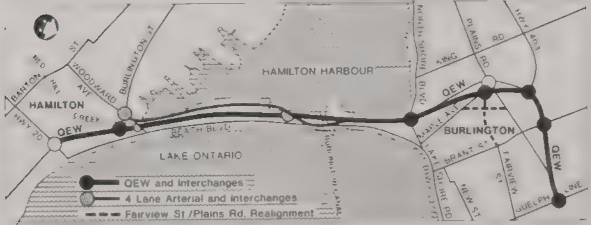
APPENDIX D – News Media Coverage

ONTARIO GOVERNMENT NOTICE

QUEEN ELIZABETH WAY IMPROVEMENTS

Guelph Line to Highway 20

PUBLIC INFORMATION CENTRES



The Ontario Ministry of Transportation and Communications (MTC) currently intends to start construction on the Stage 1 improvements for this section of the QEW in the near future The major features of the Stage 1 improvements include

- A new four-lane arterial road from Burlington Street in Hamilton to Highway 2 in Burlington
- Reconstruction of the QEW from Highway 2 to Highway 403, including interchange improvements at Highway 2, Plains Road, Fairview Street, and Highway 403
- Construction of a noise barrier on the west side of the QEW between Highway 2 and Plains Road

Required approvals under the Environmental Assessment Act are now being processed

Future additional improvements under stages 2 and 3, including a new Skyway are subject to further Environmental Assessment now nearing completion These improvements will require formal approvals under the Environmental Assessment Act

All three improvement stages will be reviewed and discussed at public information centres as follows

TUESDAY, SEPTEMBER 29, 1981
2:00 p.m. – 5:00 p.m. and
7:00 p.m. – 9:30 p.m.
AT: Seminar Room,
Burlington Central Library,
2331 New Street, Burlington.

WEDNESDAY, SEPTEMBER 30, 1981
2:00 p.m. – 5:00 p.m. and
7:00 p.m. – 9:30 p.m.
AT: Woodward Avenue Public School,
575 Woodward Avenue, Hamilton.

For further information call either

Mr N Sen P Eng Senior Project Manager
MTC (416) 224-7552

Mr P Askie P Eng. Senior Project Manager
MTC (416) 224-7600

Ministry of
Transportation and
Communications

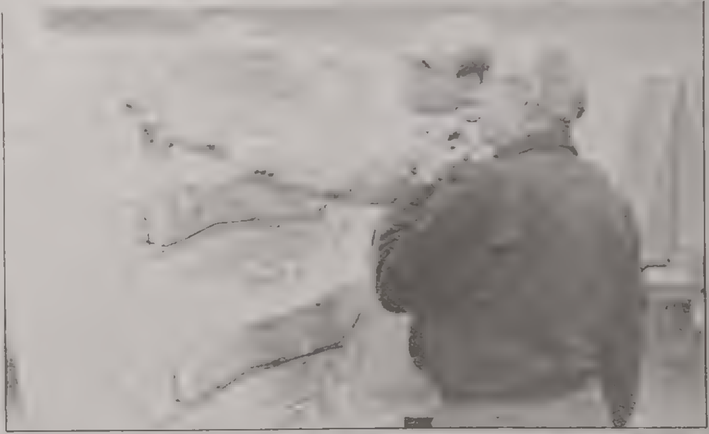

Paul Askie of the Ontario Ministry of Transportation and Communications explains the Skyway Bridge and Q.E. Niagara improvements to a local resident, at an information meeting this week. Only one of three phases planned has been approved

Photo by ROGER BOTTING

Four, not two ways to go

By DENNIS SMITH
Post Staff

The Skyway Bridge improvements controversy isn't as cut and-dried as it seems

There are four options for improving highway traffic movement across the Burlington Bay not two as some believe

The choices are twinning the Skyway Bridge adding a tunnel and retaining the Skyway adding the tunnel with capacity to twin it while retaining the Skyway, or building a twin tunnel and removing the Skyway

"Any of the schemes will be a significant improvement," said Paul Askie of the Ontario Ministry of Transportation and Communications

Askie and other MTC officials hosted a public session Tuesday at the Burlington Central Library to explain the proposed improvements for the Skyway Bridge area and the Q E Niagara highway

The MTC has the green light for Stage 1 of the improvements but a decision on Stages 2 and 3 isn't likely until early next year

Stage 1 includes a new arterial road on the Beach Strip plus improvements to the Q E Niagara

Stage 2 contains the most controversial item, the bridge twinning proposal while Stage 3 includes further highway improvements and connections

The bridge or tunnel question has been a hot issue with Hamilton-Wentworth politicians and the MTC supporting the twinning, while Burlington city council favors the tunnel proposal

Comparing the bridge and tunnel options the MTC study shows the former option is initially cheaper, while the tunnel option is considered safer and less expensive to maintain

Another major factor is timing, because if all goes smoothly twinning of the Skyway can start in 1983, but tunnel construction could not commence until 1987 said Askie

Of the options MTC officials estimate twinning would cost $38 million in 1981 dollars, while the various tunnel options would cost between $58 and $99 million.

The net operating cost savings calculated for 25 years after project completion, would be $33 6 million for twinning and from $36 8 to $39 6 million for the tunnel options

Going through with any of the four options would be an improvement over the single bridge currently being used, noted Askie.

Public submissions on the matter can be made to the MTC before the month's end

WEEKEND POST October 3, 1981

APPENDIX D - News Media Coverage

Skyway twin gets support

THE MINISTRY of transportation won support from the region's engineering services committee yesterday for another skyway instead of a beach strip tunnel

The committee, after hearing Ministry of Transportation and Communications representatives explain the advantages of a bridge over a tunnel, had no questions and only one comment build it, fast

"Let's get on with the job," Hamilton Alderman Fred Lombardo said He said he was sure the same information had been presented five years ago

Hamilton Alderman Reg Wheeler said he had been contacted by Burlington councillors wondering why councillors on this side of the bay don't support Burlington in its push to get a tunnel built instead of a bridge

Mr Wheeler said looking at the MTC presentation convinced him "you can't help but see they should go with the bridge."

The MTC says adding a second bridge will cost at least $20 million less than paralleling the existing skyway with a tunnel, will require less than half the amount of filling of Hamilton Harbor and will need the least land

The MTC also says having two bridges, each with three through lanes plus a truck climbing lane, will greatly reduce accidents by bringing the road capacity up to the level of traffic

But the accident rate is predicted to be even lower using a tunnel twinned with a bridge and lower still with twin tunnels

THE SPECTATOR SEPT 29, 1981

Man, 67, losing home over QEW

By PETER VAN HARTEN
Spectator Staff

LARENCE MILLAR got the word yesterday — they want his house for improvements to the Skyway bridge and the Queen Elizabeth Way.

"I kind of thought they might. The highways department approached me a few years back," said the 67-year-old Kirk Road resident.

Along with dozens of other Burlington and Hamilton residents, Mr. Millar got a look yesterday at the plans for the QEW improvement and preliminary drawings of a twin Skyway bridge.

The ministry of transportation and communications is holding open houses in Burlington and Hamilton to outline the highway hanges.

"I had to move in 1958 when they expanded the QEW and I thought I was safe after hat, but it looks like I have to go again," aid Mr. Millar who has lived in the Hamilton beach community since 1939

Noise barriers

The ministry is holding a meeting at Woodward Avenue school in Hamilton today, but Mr. Millar and other Hamilton residents went to a meeting in Burlington yesterday to get an early peek.

Fortunately it appears he may not have to move until about 1983 or 1984 when his property will be required for noise barriers to be constructed during a later stage of the work, he said

The ministry is going ahead with the first stage of the improvements which includes a new four-lane arterial road over a modified lift bridge, a reconstructed QEW and modified interchanges

The ministry wants approval for a twin bridge — stage two of the project — although Burlington holds out hopes for a tunnel instead

Portions of about 35 properties are required for stage one.

Mr Millar's brother, Joe Millar of Rembe Avenue, was also at the open house.

"I'm home free I don't have to move," he said

'Good job'

The two brothers extolled the joys of living along the Beach Strip

"You get used to the noise and the smog and everybody is friendly and helps each other out," said Mr Millar of Kirk Road

And William Gould and his wife of Beach Boulevard say they welcome the changes because it will make the area an even better place to live.

They have lived in the area for 29 years and said the noise barriers will help residents

And most of the work was being done on the harbour side so as few residents as possible would be affected he said

"They are doing a good job. It's just bad that they have let it go for so long," Mr Gould said.

The Beach Strip and Skway bridge have become traffic nightmares and changes are badly needed, said Mr. Gould. He favours a twin bridge because it will be cheaper than a tunnel

Area residents examine details of Skyway and QEW changes

The problems with the present bridge can be attributed to traffic volume, not the weather, he said

The open house today will be held from 2 to 5 p m and from 7 to 9 30 p.m. at Woodward Avenue school

THE SPECTATOR, BURLINGTON · SEPTEMBER 30, 1981.

APPENDIX D – News Media Coverage

WEST4/TORONTO STAR, TUESDAY, NOVEMBER 10, 1981

Skyway tunnel would delay traffic solution

By Brian Dexter Toronto Star

BURLINGTON — A four-year delay in solving Burlington Skyway traffic problems was forecast last week if Ontario's transportation ministry loses a battle to build a second bridge and is forced to tunnel a length the Queen Elizabeth Way under the Burlington Ship Canal.

Transportation ministry planners are preparing an answer environment ministry submissions that there isn't sufficient justification for a second bridge, with five southbound traffic lanes.

Paul Askie, transportation ministry project manager, says the proposed $38 million bridge is currently scheduled for completion in late 1987.

Four-year delay

A four-year delay for a tunnel would be caused by extra planning time approvals, design and construction, he says. It could be even longer because the least costly tunnel scheme has a price tag of $72.8 million and as a result, funding approval could be difficult to get.

Askie adds the transportation ministry is convinced its proposal for a bridge, rather than a tunnel, is the most sensible from economic and safety standpoints.

Since the early 1970s engineers have been working steadily toward improvements to the QEW between Burlington's Guelph Line and Highway 20 in Hamilton.

And last week the ministry released to The Star a modified art-photo impression of the proposed Skyway bridge and tunnel. At the moment the 6,800-foot long Skyway, completed in 1958 at a cost of $19 million, is considered one of the worst traffic bottlenecks along the QEW.

It reached its traffic design capacity in 1972. The Skyway-Beach Blvd., corridor handled an average 67,000 vehicles daily last year, and the total is expected to increase to 100,000 around the turn of the century.

So far the bridge project has received approval from Hamilton-Wentworth Regional Council and Hamilton Council but Burlington Council and Halton Regional Council have recently called for more consideration of a tunnel under the entrance to Hamilton Harbor.

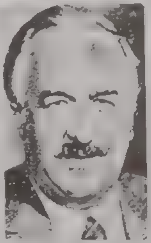
Burlington and Malton Councils however, have made no formal objection to a bridge twinning, nor have they tried to force a hearing under the Environmental Assessment Act.

Last week a Burlington council spokesman says most of the city's concerns have been answered by the transportation ministry, but the issue will be considered at a public works committee meeting scheduled for Nov. 16.

A spokesman for Halton Region says the issue may be considered by a committee tomorrow on Nov. 25.

THE SPECTATOR, BURLINGTON JANUARY 20 1982

Jim set to walk on the Skyway



JIM SNOW
Challenged

JIM SNOW says he is willing to walk the Skyway bridge with Eric Cunningham anytime.

After high winds forced the closing of the bridge to truck traffic for the second time last week, Mr. Cunningham, Liberal MLA for Wentworth North, offered to walk across the bridge with Mr. Snow, Ontario transport minister, on a stormy day to prove how hazardous the bridge can be.

While some politicians might say they would cross that bridge when they come to it, Mr Snow is prepared to accept the challenge now.

"I wouldn't be afraid to walk across there anytime," the transport minister said. "Day or night, if he wants to walk with me, tell him I'm ready."

But a newspaper headline presented a more difficult problem for Mr. Snow.

Citing a recent Spectator headline that read "Jim better not try a Snow job," the minister said his ancestors never thought there would be a politician in the family when they chose their surname

"At least it assures my popularity with some members of the press," he said, "If only because I'm a headline writer's dream."

The Spectator, Burlington, Wednesday, January 20, 1982 7

Snow worried by tunnel safety

TRANSPORTATION Minister Jim Snow says an accident last February on the Skyway Bridge could have been much more serious in a tunnel

"While a tunnel would be protected from the wind, I do have some serious concerns about the transportation of dangerous goods," the Ontario minister said yesterday.

"That Skyway Bridge crash last February, when a cloud of lethal gas was released, might have been a disaster had it occurred in a tunnel," he told a Burlington Chamber of Commerce meeting

A truck, carrying chemicals, was involved in a three-truck accident on the bridge Feb. 10.

As the truck burned, the air was filled with potentially lethal smoke causing evacuation of 600 workers from Canadian Centre for Inland Waters, and between 150 and 200 residents of Beach Boulevard in Hamilton

No one was seriously injured in the crash, although 12 persons, including a baby girl, were treated for chemical and smoke inhalation.

Mr Snow said there are no restrictions \on the transportation of dangerous goods through tunnels in Ontario

"There are, however, such restrictions within the United States and it's possible they might be implemented here some time in the future — although I'm not predicting it at this moment."

More land

Making no secret of his preference for a twinned bridge rather than a tunnel, Mr. Snow said a bridge would be far less expensive to build and slightly less costly to run.

Burlington has been pushing the province to build a tunnel rather than a twin bridge

Mr Snow said a tunnel would reduce noise by about a decibel but would require twice as much land as a bridge

Mr Snow said both options would be safe and the accident rate would be reduced.

"Because in both cases there would be protection from the two things that have historically been responsible for accidents on the Skyway — the high winds and the large speed differential between cars and trucks.

"With a truck climbing lane, and four other lanes each way, two lanes could be designated for trucks during high winds without affecting traffic flow."

He said the additional lanes would also permit vehicles to be better spaced so there would be a more gradual speed differential across the lanes

After outlining other road improvements in the Burlington area, Mr Snow said a Walker's Line underpass at the Canadian National Railway tracks is being held up by the federal government share of funding

APPENDIX E - 1972/74 Analysis and Evaluation of Alternatives

ANALYSIS OF ALTERNATIVES

GUELPH LINE TO PLAINS RD. FAIRVIEW STREET

OBJECTIVE	1 FREEWAY + TRANSIT			
	A			
	E	D		
A IMPROVE TRAFFIC SERVICE	LEVEL OF SERVICE E	LEVEL OF SERVICE E		
B FLEXIBILITY TO MEET FUTURE NEEDS	[illegible] TRANSIT EXPANSION	[illegible] TRANSIT EXPANSION		
C CONTROL CONSTRUCTION & MAINTENANCE COSTS	34.0	39.5		
D MINIMIZE PROPERTY REQUIREMENTS (AC.)	07 (35)	07 (35)		
E PRESERVE COMMUNITY IDENTITY & COHESION	NO IMPACT	NO IMPACT		
F MINIMIZE NOISE AIR & WATER POLLUTION	64-73 dBA	64-[illegible] dBA		
G PRESERVE NATURAL WILDLIFE HABITATS & UNIQUE AREAS	NO IMPACT	NO IMPACT		
H DEVELOP AN AESTHETIC TRANSPORTATION FACILITY	FAIR	[illegible]		
I IMPROVE TRAFFIC SAFETY	APPROACH [illegible] 35 SEP. OF [illegible] TYPES	APPROACH [illegible] 35 [illegible]		

AG - AT GRADE E - ELEVATED D - DEPRESSED

OBJECTIVE	2 FREEWAY + COLL. + TRANSIT			
	A			
	E	D		
A IMPROVE TRAFFIC SERVICE	LEVEL OF SERVICE D	LEVEL OF SERVICE D		
B FLEXIBILITY TO MEET FUTURE NEEDS	GOOD	[illegible]		
C CONTROL CONSTRUCTION & MAINTENANCE COSTS	[illegible]	46.5		
D MINIMIZE PROPERTY REQUIREMENTS (AC.)	0 42	0 42		
E PRESERVE COMMUNITY IDENTITY & COHESION	NO IMPACT	NO IMPACT		
F MINIMIZE NOISE AIR & WATER POLLUTION	68-74 dBA	66-74 dBA		
G PRESERVE NATURAL WILDLIFE HABITATS & UNIQUE AREAS	NO IMPACT	NO IMPACT		
H DEVELOP AN AESTHETIC TRANSPORTATION FACILITY	FAIR	GOOD		
I IMPROVE TRAFFIC SAFETY	APPROACH ACC. OF [illegible] NO SEP. OF [illegible]	APPROACH [illegible] SEP. OF [illegible]		

AG - AT GRADE E - ELEVATED D - DEPRESSED

OBJECTIVE	3 FREEWAY + COLLECTORS			
	A			
	E	D		
A IMPROVE TRAFFIC SERVICE	LEVEL OF SERVICE D	LEVEL OF SERVICE D		
B FLEXIBILITY TO MEET FUTURE NEEDS	GOOD	GOOD		
C CONTROL CONSTRUCTION & MAINTENANCE COSTS	43.[illegible]	50.0		
D MINIMIZE PROPERTY REQUIREMENTS (AC.)	[illegible]	[illegible]		
E PRESERVE COMMUNITY IDENTITY & COHESION	NO IMPACT	NO IMPACT		
F MINIMIZE NOISE AIR & WATER POLLUTION	66-73 dBA	64-[illegible] dBA		
G PRESERVE NATURAL WILDLIFE HABITATS & UNIQUE AREAS	NO IMPACT	NO IMPACT		
H DEVELOP AN AESTHETIC TRANSPORTATION FACILITY	FAIR	GOOD		
I IMPROVE TRAFFIC SAFETY	APPROACH ACC. OF 85 NO SEP. OF VT	[illegible]		

AG - AT GRADE E - ELEVATED D - DEPRESSED

ANALYSIS OF ALTERNATIVES

FAIRVIEW STREET TO HIGHWAY 2

OBJECTIVE	1 FREEWAY + TRANSIT			
	A		B	
	AG	D	AG	D
A IMPROVE TRAFFIC SERVICE	LEVEL OF SERVICE [illegible]	LEVEL OF SERVICE [illegible]	LEVEL OF SERVICE [illegible]	LEVEL OF SERVICE [illegible]
B FLEXIBILITY TO MEET FUTURE NEEDS	[illegible] TRANSIT EXPANSION	[illegible] TRANSIT EXPANSION	[illegible] TRANSIT EXPANSION	[illegible] TRANSIT EXPANSION
C CONTROL CONSTRUCTION & MAINTENANCE COSTS	16.0	[illegible]	[illegible]	[illegible]
D MINIMIZE PROPERTY REQUIREMENTS (AC.)	20 (40)	20 (40)	30 (70)	30 (70)
E PRESERVE COMMUNITY IDENTITY & COHESION	[illegible] HOMES	[illegible] HOMES	[illegible] FARM ENTRANCES	[illegible] FARM ENTRANCES
F MINIMIZE NOISE AIR & WATER POLLUTION	[illegible] dBA	[illegible] dBA	[illegible]	64-68 dBA [illegible]
G PRESERVE NATURAL WILDLIFE HABITATS & UNIQUE AREAS	[illegible]	[illegible]	NO IMPACT	NO IMPACT
H DEVELOP AN AESTHETIC TRANSPORTATION FACILITY	FAIR	GOOD	FAIR	GOOD
I IMPROVE TRAFFIC SAFETY	APPROACH [illegible] SEP. OF VEH. TYPES	APPROACH [illegible] SEP. OF VEH. TYPES	APPROACH [illegible] SEP. OF VEH. TYPES	APPROACH [illegible] SEP. OF VEH. TYPES

AG - AT GRADE E - ELEVATED D - DEPRESSED

OBJECTIVE	2 FREEWAY + COLL + TRANSIT			
	A		B	
	AG	D	AG	D
A IMPROVE TRAFFIC SERVICE	[illegible]	[illegible]	[illegible]	[illegible]
B FLEXIBILITY TO MEET FUTURE NEEDS	[illegible]	[illegible]	[illegible]	[illegible]
C CONTROL CONSTRUCTION & MAINTENANCE COSTS	[illegible]	[illegible]	[illegible]	[illegible]
D MINIMIZE PROPERTY REQUIREMENTS (AC.)	[illegible]	[illegible]	[illegible]	[illegible]
E PRESERVE COMMUNITY IDENTITY & COHESION	[illegible]	[illegible]	[illegible]	[illegible]
F MINIMIZE NOISE AIR & WATER POLLUTION	[illegible]	[illegible]	[illegible]	[illegible]
G PRESERVE NATURAL WILDLIFE HABITATS & UNIQUE AREAS	[illegible]	[illegible]	[illegible]	[illegible]
H DEVELOP AN AESTHETIC TRANSPORTATION FACILITY	[illegible]	[illegible]	[illegible]	[illegible]
I IMPROVE TRAFFIC SAFETY	[illegible]	[illegible]	[illegible]	[illegible]

OBJECTIVE	3 FREEWAY + COLLECTORS			
	A		B	
	AG	D	AG	D
A IMPROVE TRAFFIC SERVICE	LEVEL OF SERVICE [illegible]	LEVEL OF SERVICE [illegible]	LEVEL OF SERVICE [illegible]	LEVEL OF SERVICE D
B FLEXIBILITY TO MEET FUTURE NEEDS	GOOD	GOOD	[illegible]	GOOD
C CONTROL CONSTRUCTION & MAINTENANCE COSTS	[illegible]	[illegible]	[illegible]	[illegible]
D MINIMIZE PROPERTY REQUIREMENTS (AC.)	[illegible]	[illegible]	[illegible] 85	[illegible] 85
E PRESERVE COMMUNITY IDENTITY & COHESION	[illegible] HOMES	[illegible] HOMES	[illegible] FARM ENTRANCES	[illegible] FARM ENTRANCES
F MINIMIZE NOISE AIR & WATER POLLUTION	[illegible] dBA	[illegible] dBA	[illegible] dBA	[illegible] dBA
G PRESERVE NATURAL WILDLIFE HABITATS & UNIQUE AREAS	[illegible]	[illegible]	NO IMPACT	NO IMPACT
H DEVELOP AN AESTHETIC TRANSPORTATION FACILITY	FAIR	GOOD	FAIR	GOOD
I IMPROVE TRAFFIC SAFETY	APPROACH [illegible]	APPROACH [illegible]	APPROACH [illegible]	APPROACH [illegible]

AG - AT GRADE E - ELEVATED D - DEPRESSED

ANALYSIS OF ALTERNATIVES

HIGHWAY 2 TO WOODWARD AVENUE (EXCLUDING CANAL CROSSING)

OBJECTIVE	1 FREEWAY + TRANSIT			
	AG			
	A	B	C	D
A IMPROVE TRAFFIC SERVICE	[illegible]	[illegible]	[illegible]	[illegible]
B FLEXIBILITY TO MEET FUTURE NEEDS	[illegible]	[illegible]	[illegible]	[illegible]
C CONTROL CONSTRUCTION & MAINTENANCE COSTS	[illegible]	[illegible]	[illegible]	[illegible]
D MINIMIZE PROPERTY REQUIREMENTS AC. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
E PRESERVE COMMUNITY IDENTITY & COHESION	[illegible]	[illegible]	[illegible]	[illegible]
F MINIMIZE NOISE AIR & WATER POLLUTION	[illegible]	[illegible]	[illegible]	[illegible]
G PRESERVE NATURAL WILDLIFE HABITATS & UNIQUE AREAS	[illegible]	[illegible]	[illegible]	[illegible]
H DEVELOP AN AESTHETIC TRANSPORTATION FACILITY	[illegible]	[illegible]	[illegible]	[illegible]
I IMPROVE TRAFFIC SAFETY	[illegible]	[illegible]	[illegible]	[illegible]

AG - AT GRADE E - ELEVATED D - DEPRESSED

OBJECTIVE	2 FREEWAY + COLL + TRANSIT			
	AG			
	A	B	C	D
A IMPROVE TRAFFIC SERVICE	LEVEL OF SERVICE [illegible]	LEVEL OF SERVICE [illegible]	LEVEL OF SERVICE [illegible]	LEVEL OF SERVICE [illegible]
B FLEXIBILITY TO MEET FUTURE NEEDS	[illegible]	[illegible]	[illegible]	[illegible]
C CONTROL CONSTRUCTION & MAINTENANCE COSTS	[illegible]	[illegible]	[illegible]	[illegible]
D MINIMIZE PROPERTY REQUIREMENTS (AC.)(HOUSES)	28 (35) [illegible]	[illegible]	[illegible]	[illegible]
E PRESERVE COMMUNITY IDENTITY & COHESION	[illegible]	NO IMPACT	NO IMPACT	[illegible]
F MINIMIZE NOISE AIR & WATER POLLUTION	[illegible] dBA	[illegible] dBA	[illegible] dBA	[illegible] dBA
G PRESERVE NATURAL WILDLIFE HABITATS & UNIQUE AREAS	[illegible]	[illegible]	[illegible]	[illegible]
H DEVELOP AN AESTHETIC TRANSPORTATION FACILITY	[illegible]	GOOD	[illegible]	[illegible]
I IMPROVE TRAFFIC SAFETY	APPROACH [illegible]	APPROACH [illegible]	APPROACH [illegible]	APPROACH [illegible]

AG - AT GRADE E - ELEVATED D - DEPRESSED

OBJECTIVE	3 FREEWAY + COLLECTORS			
	AG			
	A	B	C	D
A IMPROVE TRAFFIC SERVICE	LEVEL OF SERVICE [illegible]	LEVEL OF SERVICE [illegible]	LEVEL OF SERVICE [illegible]	[illegible]
B FLEXIBILITY TO MEET FUTURE NEEDS	GOOD	GOOD	[illegible]	[illegible]
C CONTROL CONSTRUCTION & MAINTENANCE COSTS	[illegible]	[illegible]	[illegible]	[illegible]
D MINIMIZE PROPERTY REQUIREMENTS (AC.)(HOUSES)	[illegible]	[illegible]	[illegible]	[illegible]
E PRESERVE COMMUNITY IDENTITY & COHESION	SIGNIFICANT IMPACT [illegible]	NO IMPACT	NO IMPACT	SIGNIFICANT IMPACT [illegible]
F MINIMIZE NOISE AIR & WATER POLLUTION	[illegible] dBA	[illegible] dBA	[illegible] dBA	[illegible] dBA
G PRESERVE NATURAL WILDLIFE HABITATS & UNIQUE AREAS	[illegible]	[illegible]	[illegible]	[illegible]
H DEVELOP AN AESTHETIC TRANSPORTATION FACILITY	[illegible]	[illegible]	FAIR	[illegible]
I IMPROVE TRAFFIC SAFETY	APPROACH [illegible]	APPROACH [illegible]	APPROACH [illegible]	[illegible]

AG - AT GRADE E - ELEVATED D - DEPRESSED

APPENDIX E – 1972/74 Analysis and Evaluation of Alternatives

ANALYSIS OF ALTERNATIVES

WOODWARD AVENUE TO HIGHWAY 20

OBJECTIVE	1 FREEWAY + TRANSIT	
	A	
	AG	
A [illegible]	[illegible]	
B [illegible]	[illegible]	
C [illegible]	[illegible]	
D [illegible]	[illegible]	
E [illegible]	[illegible]	
F [illegible]	[illegible]	
G [illegible]	[illegible]	
H [illegible]	[illegible]	
I [illegible]	[illegible]	

AG – AT GRADE E – ELEVATED D – DEPRESSED

OBJECTIVE	2 FREEWAY + COLL + TRANSIT	
	A	
	AG	
A [illegible]	[illegible]	
B [illegible]	[illegible]	
C [illegible]	[illegible]	
D [illegible]	[illegible]	
E [illegible]	[illegible]	
F [illegible]	[illegible]	
G [illegible]	[illegible]	
H [illegible]	[illegible]	
I [illegible]	[illegible]	

AG – AT GRADE E – ELEVATED D – DEPRESSED

OBJECTIVE	3 FREEWAY + COLLECTORS	
	A	
	AG	
A [illegible]	[illegible]	
B [illegible]	[illegible]	
C [illegible]	[illegible]	
D [illegible]	[illegible]	
E [illegible]	[illegible]	
F [illegible]	[illegible]	
G [illegible]	[illegible]	
H [illegible]	[illegible]	
I [illegible]	[illegible]	

AG – AT GRADE E – ELEVATED D – DEPRESSED

ANALYSIS OF ALTERNATIVES

CANAL CROSSING

OBJECTIVE	1 FREEWAY + TRANSIT			
	BRIDGE		TUNNEL	
	SHLDS	NO SHLDS	SHLDS	NO SHLDS
A [illegible]	LEVEL OF SERVICE E	LEVEL OF SERVICE E	LEVEL OF SERVICE E	[illegible]
B [illegible]	LIMITED TO TRANSIT EXPANSION	LIMITED TO TRANSIT EXPANSION	LIMITED TO TRANSIT EXPANSION	LIMITED TO TRANSIT EXPANSION
C [illegible]	510	430	515	430
D [illegible]				
E [illegible]	[illegible]	[illegible]	[illegible]	NOT APPLICABLE
F [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
G [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
H DEVELOP AN AESTHETIC TRANSPORTATION FACILITY	[illegible]	[illegible]	[illegible]	[illegible]
I [illegible]	[illegible]		NO WIND HAZARD [illegible]	

AG – AT GRADE E – ELEVATED D – DEPRESSED

OBJECTIVE	2 FREEWAY + COLL + TRANSIT			
	BRIDGE		TUNNEL	
	SHLDS	NO SHLDS	SHLDS	NO SHLDS
A [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B [illegible] NEEDS	[illegible]	FAIR	[illegible]	FAIR
C [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
D [illegible]				
E [illegible]	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
F [illegible]	[illegible] HIGH NOISE LEVELS		VARIABLE LOWER NOISE LEVELS	
G [illegible] HABITATS & UNIQUE AREAS	[illegible]	[illegible]	[illegible]	[illegible]
H DEVELOP AN AESTHETIC TRANSPORTATION FACILITY	POOR	POOR	GOOD	GOOD
I [illegible]	[illegible]		[illegible]	

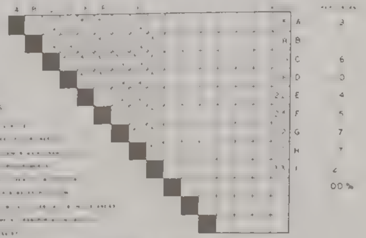
AG – AT GRADE E – ELEVATED D – DEPRESSED

OBJECTIVE	3 FREEWAY + COLLECTORS			
	BRIDGE		TUNNEL	
	SHLDS	NO SHLDS	SHLDS	NO SHLDS
A [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B [illegible] FUTURE NEEDS	[illegible]	FAIR	[illegible]	FAIR
C CONTROL CONSTRUCTION & MAINTENANCE COSTS	690	460	650	480
D [illegible]				
E [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
F [illegible] WATER POLLUTION	[illegible]	[illegible]	[illegible]	[illegible]
G PRESERVE NATURAL WILDLIFE [illegible]	NO IMPACT	NO IMPACT	NO IMPACT	NO IMPACT
H [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
I [illegible]	[illegible]		[illegible]	

AG – AT GRADE E – ELEVATED D – DEPRESSED

WEIGHTING OF OBJECTIVES

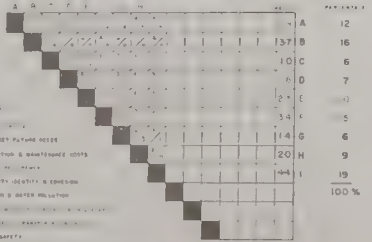
PROJECT TEAM



OBJECTIVES

A [illegible]
B [illegible]
C [illegible]
D [illegible]
E [illegible]
F [illegible]
G [illegible]
H [illegible]

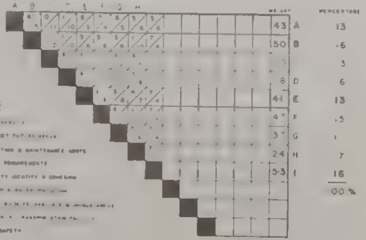
INTERNAL TEAM



OBJECTIVES

A [illegible]
B FLEXIBILITY TO MEET FUTURE NEEDS
C CONTROL CONSTRUCTION & MAINTENANCE COSTS
D [illegible]
E PRESERVE COMMUNITY IDENTITY & COHESION
F MINIMIZE NOISE AIR & WATER POLLUTION
G [illegible]
H [illegible]
I IMPROVE TRAFFIC SAFETY

EXTERNAL TEAM



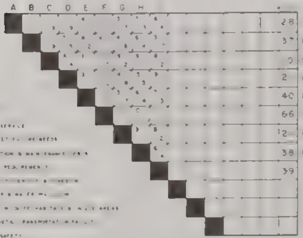
OBJECTIVES

A [illegible]
B FLEXIBILITY TO MEET FUTURE NEEDS
C CONTROL CONSTRUCTION & MAINTENANCE COSTS
D MINIMIZE PROPERTY REQUIREMENTS
E PRESERVE COMMUNITY IDENTITY & COHESION
F [illegible]
G PRESERVE NATURAL WILDLIFE HABITATS & UNIQUE AREAS
H DEVELOP AN AESTHETIC TRANSPORTATION FACILITY
I IMPROVE TRAFFIC SAFETY

APPENDIX E – 1972/74 Analysis and Evaluation of Alternatives

WEIGHTING OF OBJECTIVES

NEIGHBOURHOOD MEETINGS

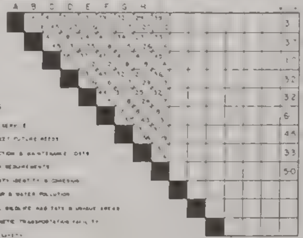


28	A	9
37	B	2
0	C	3
2	D	7
40	E	4
66	F	22
12	G	7
38	H	3
39	I	3
		100 %

OBJECTIVES

A IMPROVE TRAFFIC SERVICE
B FLEXIBILITY TO MEET FUTURE NEEDS
C CONTROL CONSTRUCTION & MAINTENANCE COSTS
D MINIMIZE PROPERTY REQUIREMENTS
E PRESERVE COMMUNITY IDENTITY & COHESION
F MINIMIZE NOISE AIR & WATER POLLUTION
G PRESERVE NATURAL WILDLIFE HABITATS & UNIQUE AREAS
H DEVELOP AN AESTHETIC TRANSPORTATION FACILITY
IMPROVE TRAFFIC SAFETY

PUBLIC MEETINGS AND INFORMATION CENTRES

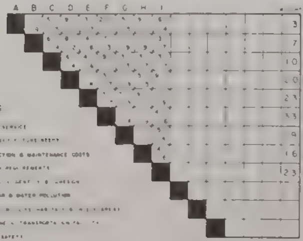


3	A	9
37	B	[illegible]
10	C	3
32	D	10
32	E	0
6	F	8
45	G	4
33	H	0
50	I	5
		100 %

OBJECTIVES

A IMPROVE TRAFFIC SERVICE
B FLEXIBILITY TO MEET FUTURE NEEDS
C CONTROL CONSTRUCTION & MAINTENANCE COSTS
D MINIMIZE PROPERTY REQUIREMENTS
E PRESERVE COMMUNITY IDENTITY & COHESION
F MINIMIZE NOISE AIR & WATER POLLUTION
G PRESERVE NATURAL WILDLIFE HABITATS & UNIQUE AREAS
H DEVELOP AN AESTHETIC TRANSPORTATION FACILITY
IMPROVE TRAFFIC SAFETY

BELL CAIRNE SCHOOL



3	A	7
7	B	0
10	C	6
40	D	[illegible]
23	E	3
33	F	9
9	G	[illegible]
16	H	9
23		4
		100 %

OBJECTIVES

A IMPROVE TRAFFIC SERVICE
B FLEXIBILITY TO MEET FUTURE NEEDS
C CONTROL CONSTRUCTION & MAINTENANCE COSTS
D MINIMIZE PROPERTY REQUIREMENTS
E PRESERVE COMMUNITY IDENTITY & COHESION
F MINIMIZE NOISE AIR & WATER POLLUTION
G PRESERVE NATURAL WILDLIFE HABITATS & UNIQUE AREAS
H DEVELOP AN AESTHETIC TRANSPORTATION FACILITY
IMPROVE TRAFFIC SAFETY

COMPARISON OF ALTERNATIVES - UNWEIGHTED

GUELPH LINE TO FAIRVIEW STREET

OBJECTIVE	1		2		3	
	A		A		A	
	E	D	E	D	E	D
A IMPROVE TRAFFIC SERVICE	8	8	0	10	0	0
B FLEXIBILITY TO MEET FUTURE NEEDS	9	9	0	0	0	0
C CONTROL CONSTRUCTION & MAINTENANCE COSTS	0	8	8	6	7	5
D MINIMIZE PROPERTY REQUIREMENTS	10	0	7	7	7	7
E PRESERVE COMMUNITY IDENTITY & COHESION	10	10	0	0	0	0
F MINIMIZE NOISE AIR & WATER POLLUTION	9	10	8	9	8	9
PRESERVE NATURAL WILDLIFE HABITATS & UNIQUE AREAS	10	0	10	0	0	10
H DEVELOP AN AESTHETIC TRANSPORTATION FACILITY	7	10	6	9	6	9
IMPROVE TRAFFIC SAFETY	9	10	9	0	8	9

AG - AT GRADE E - ELEVATED D - DEPRESSED

FAIRVIEW STREET TO HIGHWAY 2

OBJECTIVE	1				2				3			
					FREEWAY + COLL + [illegible]							
	A		B		A		B		A		B	
	AG	D	AG	D	AG	D	AG	D	AG	D	AG	D
A IMPROVE TRAFFIC SERVICE	8	5	8	8	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0
B FLEXIBILITY TO MEET FUTURE NEEDS	9	9	9	9	0	0	[illegible]	0	0	0	0	[illegible]
CONTROL CONSTRUCTION & MAINTENANCE COSTS	10	6	9	6	10	4	9	4	9	4	8	3
MINIMIZE PROPERTY REQUIREMENTS	[illegible]	[illegible]	6	6	9	8	4	4	8	9	4	4
E PRESERVE COMMUNITY IDENTITY & COHESION	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
F MINIMIZE NOISE AIR & WATER POLLUTION	[illegible]	6	8	[illegible]	[illegible]	4	8	[illegible]	2	4	4	[illegible]
PRESERVE NATURAL WILDLIFE HABITATS & UNIQUE AREAS	9	9	[illegible]	[illegible]	9	9	[illegible]	[illegible]	9	9	[illegible]	[illegible]
H DEVELOP AN AESTHETIC TRANSPORTATION FACILITY	5	8	[illegible]	[illegible]	4	[illegible]	6	9	4	[illegible]	6	9
IMPROVE TRAFFIC SAFETY	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9	9	[illegible]	[illegible]

AG - AT GRADE E - ELEVATED D - DEPRESSED

HIGHWAY 2 TO BEACH BOULEVARD

OBJECTIVE	1				2				3			
	AG				AG				AG			
	A	B	C	D	A	B	C	D	A	B	C	D
A IMPROVE TRAFFIC SERVICE	8	8	8	8	10	0	10	10	10	10	10	10
B FLEXIBILITY TO MEET FUTURE NEEDS	9	9	9	9	0	0	10	0	0	0	0	0
CONTROL CONSTRUCTION & MAINTENANCE COSTS	9	0	8	9	6	7	5	6	5	7	4	6
MINIMIZE PROPERTY REQUIREMENTS	5	0	8	3	3	9	7	2	3	9	7	2
E PRESERVE COMMUNITY IDENTITY & COHESION	3	10	10	3	3	0	10	3	3	10	10	3
F MINIMIZE NOISE AIR & WATER POLLUTION	5	5	9	0	4	4	9	9	4	4	9	9
G PRESERVE NATURAL WILDLIFE HABITATS & UNIQUE AREAS	9	8	8	0	8	7	7	9	8	7	7	9
H DEVELOP AN AESTHETIC TRANSPORTATION FACILITY	5	5	0	10	4	4	9	9	4	4	9	9
IMPROVE TRAFFIC SAFETY	0	0	0	0	0	0	10	0	9	9	9	9

AG - AT GRADE E - ELEVATED D - DEPRESSED

COMPARISON OF ALTERNATIVES - UNWEIGHTED

BURLINGTON CANAL CROSSING

OBJECTIVE	1	2	3
		FREEWAY + COLL + TRANSIT	FREEWAY + COLL [illegible]
	A	A	A
	AG	AG	AG
A IMPROVE TRAFFIC SERVICE	8	[illegible]	[illegible]
B FLEXIBILITY TO MEET FUTURE NEEDS	0	10	0
CONTROL CONSTRUCTION & MAINTENANCE COSTS	0	9	8
D MINIMIZE PROPERTY REQUIREMENTS	0	10	[illegible]
E PRESERVE COMMUNITY IDENTITY & COHESION	0	0	10
F MINIMIZE NOISE AIR & WATER POLLUTION	0	0	0
PRESERVE NATURAL WILDLIFE HABITATS & UNIQUE AREAS	0	0	[illegible]
H DEVELOP AN AESTHETIC TRANSPORTATION FACILITY	0	0	[illegible]
IMPROVE TRAFFIC SAFETY	10	0	[illegible]

AG - AT GRADE E - ELEVATED D - DEPRESSED

BEACH BOULEVARD TO HIGHWAY 20

OBJECTIVE	1				2				3			
	B		T		B		T		B		T	
	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS
A IMPROVE TRAFFIC SERVICE	7	6	8	8	7	6	0	[illegible]	9	8	[illegible]	[illegible]
B FLEXIBILITY TO MEET FUTURE NEEDS	8	6	7	7	9	7	8	8	0	8	9	9
CONTROL CONSTRUCTION & MAINTENANCE COSTS	6	8	6	8	8	10	6	7	5	7	5	[illegible]
MINIMIZE PROPERTY REQUIREMENTS	9	0	6	5	9	0	5	[illegible]	8	9	4	4
E PRESERVE COMMUNITY IDENTITY & COHESION	0	0	0	10	0	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]
F MINIMIZE NOISE AIR & WATER POLLUTION	5	5	10	0	4	4	9	9	4	4	9	9
G PRESERVE NATURAL WILDLIFE HABITATS & UNIQUE AREAS	0	10	0	10	10	0	10	0	[illegible]	0	[illegible]	[illegible]
H DEVELOP AN AESTHETIC TRANSPORTATION FACILITY	4	4	10	10	4	4	10	10	2	2	0	[illegible]
IMPROVE TRAFFIC SAFETY	5	3	10	9	3	1	9	8	4	2	9	8

AG - AT GRADE E - ELEVATED D - DEPRESSED

APPENDIX E – 1972/74 Analysis and Evaluation of Alternatives

COMPARISON OF ALTERNATIVES - WEIGHTED

BEACH BOULEVARD TO HIGHWAY 20

OBJECTIVE	1		2		3	
	A		A		A	
	E	D	E	D	E	D
A [illegible]	72	72	90	90	90	90
B [illegible]	99	99	[illegible]	[illegible]	[illegible]	[illegible]
C [illegible]	60	48	48	36	42	30
D [illegible]	[illegible]	00	70	70	70	70
E [illegible]	40	40	140	40	40	40
F [illegible]	135	50	20	35	20	135
G [illegible]	[illegible]	70	[illegible]	70	70	70
H [illegible]	49	[illegible]	42	63	42	63
I [illegible]	89	210	189	210	68	89
	[illegible]	959	879	924	852	897

[illegible]

FAIRVIEW STREET TO HIGHWAY 2

OBJECTIVE	1				2				3			
	A		B		A		B		A		B	
	AG	D	AG	D	AG	D	AG	D	AG	D	AG	D
A [illegible]	72	72	72	72	90	90	90	90	90	90	90	90
B [illegible]	99	99	99	99	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	110
C [illegible]	60	36	54	36	60	24	54	24	54	24	48	18
D [illegible]	100	00	60	60	80	80	40	40	80	80	40	40
E [illegible]	40	40	40	40	40	40	40	40	40	140	40	40
F [illegible]	[illegible]	90	120	50	[illegible]	60	20	50	30	60	20	150
G [illegible]	63	63	70	70	63	63	70	70	63	63	70	70
H [illegible]	35	56	49	70	28	49	62	63	28	49	42	63
I [illegible]	210	210	210	210	210	210	210	210	89	89	89	89
	824	866	874	907	[illegible]	826	896	897	784	805	849	870

[illegible]

HIGHWAY 2 TO BEACH BOULEVARD

OBJECTIVE	1				2				3 FREEWAY + COLLECTORS			
	AG				AG				AG			
	A	B	C	D	A	B	C	D	A	B	C	D
A [illegible]	72	72	72	72	90	90	90	90	90	90	90	90
B [illegible]	99	99	99	99	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
C [illegible]	54	66	48	54	36	42	30	36	30	42	24	36
D [illegible]	[illegible]	100	80	30	30	90	70	20	30	90	70	20
E [illegible]	42	40	14	[illegible]	42	[illegible]	140	42	42	14	40	42
F [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	60	[illegible]	35	35	60	60	35	135
G [illegible]	63	56	[illegible]	[illegible]	56	49	49	63	56	49	49	63
H [illegible]	35	35	70	70	28	28	63	63	28	28	63	63
I [illegible]	[illegible]	210	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	89	89	89	189
	[illegible]	847	[illegible]	[illegible]	662	[illegible]	897	769	635	798	870	748

AG - AT GRADE   E - ELEVATED   [illegible]

COMPARISON OF ALTERNATIVES - WEIGHTED

GUELPH LINE TO FAIRVIEW STREET

OBJECTIVE	1	2	3
	A	A	A
	AG	AG	AG
A [illegible]	72	90	90
B [illegible]	110	110	110
C [illegible]	60	54	48
D [illegible]	100	100	100
E [illegible]	40	140	40
F [illegible]	150	150	50
G [illegible]	70	70	70
H [illegible]	70	70	70
I [illegible]	210	210	210
	982	994	988

AG - AT GRADE   E - ELEVATED   D - DEPRESSED

BURLINGTON CANAL CROSSING

OBJECTIVE	1				2				3			
	B		T		B		T		B		T	
	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS
A [illegible]	63	54	72	72	63	54	90	90	81	72	90	90
B [illegible]	88	66	77	77	99	77	88	88	[illegible]	88	99	99
C [illegible] MAINTENANCE COSTS	36	48	36	48	48	60	36	42	30	42	36	42
D [illegible]	90	100	60	60	90	100	50	50	80	90	40	40
E [illegible]	40	140	40	40	40	140	140	140	40	40	40	140
F [illegible]	75	75	150	150	60	60	135	135	60	60	35	35
G [illegible]	70	70	70	70	70	70	70	70	70	70	70	70
H [illegible]	28	28	70	70	28	28	70	70	14	14	70	70
I [illegible]	[illegible]	63	210	89	63	[illegible]	89	68	84	42	189	68
	695	644	885	876	661	610	868	853	669	618	869	854

AG - AT GRADE   E - ELEVATED   D - DEPRESSED

APPENDIX F – 1972 Environmental Inventory

Interim Report

The QEW: Environmental Feasibility Study –
Guelph Line to Highway 20

for

McCormick, Rankin, and Associates

by

Ecoplans Ltd.
124 Amos Avenue
Waterloo, Ontario

November 30, 1972.

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ACKNOWLEDGEMENTS

We would like to thank Mr. D. H. Matheson, Dr. Chauncey Wood, and personnel of CCIW, OWRC, ROM, RBG, and the Hamilton Public Library, Brant Museum and Burlington Public Library for their helpful comments and use of their library resources.

This study was directed by Dr. R. S. Dorney, who also did the wildlife field observations. Dr. M. G. George wrote the section on water quality, Prof. C. Kitchen the section on vegetation, and Prof. S. G. Rich the section on amenities. Mr. C. R. Smith did the historical appraisal.

RECOMMENDATIONS

History

1. The area between the Brant Museum and the Burlington Canal is a zone of high historical interest. The designation of it as a "Heritage Park" is feasible, especially if a tunnel is constructed and the Skyway bridge removed.

2. As archeological finds, that is, Indian artifacts, are to be expected in the vicinity of the original Bay to Lake channel and marshes near the Burlington Sewage Plant, and Redhill Creek marsh and valley, during construction in these two areas periodic checks of excavations might turn up significant artifacts.

Amenities

1. The proposed highway 403-QEW interchange area should be bermed and planted, preferably prior to construction, with appropriate coniferous and hardwood vegetation to reduce noise and improve scenic amenities.

2. The attractive wooded valley between the QEW and Greenwood Cemetery/Oneida Drive should be preserved as a green buffer zone.

3. A tunnel should be given first priority. A second priority should be a double-decking of the present Skyway bridge. Cars, because they have higher acceleration and generate less noise could be exclusive users of a top deck. As lowest priority is a doubling in width of the Skyway bridge. The first, and preferable, channel crossing - the tunnel - is based

on the over-powering presence of the Skyway bridge and its production of high noise levels and grit and grime (rubber, asbestos and combustion particulates) for both the residents and recreation users of the beachstrip.

4. If a tunnel is selected and the Skyway bridge removed one benefit would be increased property values in the vicinity of the Canal. If these land values could be "captured" through Provincial land consolidation, a "Heritage Park" at low cost might be a side benefit, while poor quality housing stock could be replaced with new units, possibly with an increase in residential density.

5. The proposed Redhill-QEW interchange be consolidated with the Burlington Street and Stoney Creek interchanges, thereby preserving the Redhill marsh and valley, both valuable visual and wildlife resources. In addition the Redhill Creek marsh buffers the water quality in the Bay.

Wildlife

1. The Redhill Creek marsh is an unique wildlife resource, particularly the cattail portion west of the QEW. If it is lost in construction, replacement marshes made from borrow pits should be constructed to enhance water quality and provide wildlife areas at this end of the Bay.

2. The present or new Redhill marshes as a wildlife viewing area could be combined with Confederation Park with parking lots west of the QEW and an overhead walkway or cable car connecting both sides of the highway. This would give

Hamilton a green park as an entrance for westbound travellers, rather than the existing visually cluttered entrance.

Water Quality

1. Construction of the new highway from fill, and raw soil banks exposed to erosion should be confined to those summer months (June to September) when Lake Ontario is thermally stratified. In this way, any silt-laden or poor quality (warm water) leaving the Bay will not mix easily with cold deep water so as to foul the intake for the city water which is in the cold water (hypolimnion) zone offshore.

2. As loss of the Redhill Creek marshes will reduce the filtering and cleansing effect on contaminated upstream water entering the Bay, marsh destruction should be prevented. The quantitative importance this marsh system has on water quality in the Bay cannot be modeled(because of cost factors).

Vegetation

1. Since no vegetation of an unique ecological nature exists in the study area (based on field checks and examination of the original Crown survey notes done at the turn of the nineteenth century,) the wooded valley area between Indian Point, Greenwood Cemetery, and Redhill Creek valley are significant features,(although heavily modified by man) and deserve preservation/renovation.

2. The cottonwoods interspersed throughout homesites on Beach Boulevard are mature trees which will begin to die in the next 10 to 15 years. They should be replaced with oak, red,

and white oaks, the original tree cover, which are longer lived. Sycamore, white ash, black walnut, and soft maple are other species which could do well in a warm moist environment.

3. Vegetation reintroduced for transportation corridor purposes should reinforce the native oak-hickory hardwoods originally present in this area so that trees selected are adapted to the special soils and climate of this region and maintain historical harmony with the original vegetation, circa 1800. Of course, species resistant to salt spray, and air pollutants should be selected such as juniper (red cedar), red oak, sugar maple, silver maple, black walnut, shagbark hickory, choke cherry, balsam poplar, and staghorn sumac. White pine originally numerous because of its sensitivity to salt and air pollution should not be used, or used selectively.

LAND-USE HISTORY OF THE HIGHWAY ROUTE

Introduction

The methodology of this study leans very heavily on an historical time frame beginning circa 1790, the date of Caucasian settlement in the Hamilton-Burlington area, so that we could understand the past and present patterns of land-use which have evolved in this area. By using this historical frame of reference, coupled with measurements of the present natural environments along the proposed route, we hope to better predict the impact the proposed construction will have. Construction then can become a force for focusing on the uniqueness of environment so that it can be conserved or renovated.

Natural History of the Beach Area

Because of its strategic location, the Burlington Beach sandstrip, described by Anna Jameson in 1837 as "that remarkable tongue or slip of land which divides Burlington Bay from Lake Ontario", has had a rich history.[1] Created by lake-borne deposits of sand and gravel sometime after the last period of glaciation, the forty-eight foot high sandstrip forms a natural bridge and breakwater across the Bay. Originally, the sandstrip was broken by a narrow natural outlet, approximately one-half mile north of the Burlington Canal. This passage must have been shallow, for Mrs. Simcoe in a diary entry for March 13, 1796, observed that a Mr. Pilkington, travelling from Niagara to York, was "obliged . . . to wade across the inlet at the head of the Lake."[2] Other commentators indicate that only canoes and flat-bottomed batteaux used by the early traders could negotiate the shallow outlet.

Although descriptions of the sandstrip and adjacent Bay before European settlement are lacking, it is possible to visualize the natural environment to some degree. For example, as the sand bar developed, the east and west shores assumed different configurations: on the wave-swept east shore, a sandy-pebbly beach formed, while on the protected west side a shoreline of accumulated silt and humus gradually formed. In all probability this difference in shore structure had a pronounced effect on vegetation patterns of the sand bar. It might be expected that,on the east shore, beach grasses and small shrubs adapted to the inhospitable site. By contrast, on the protected bay-side with its more fertile soil, oaks and willows with marsh grasses stretched along the bar. Mrs. Simcoe writes that "The Beach is like a park covered with large spreading Oaks." Immediately along the western shoreline, Patrick Campbell noted that ". . . there grows very long grass, which the neighbouring inhabitants cut down for hay and it is extremely useful to them."[3]

The beach strip and adjacent Bay must have been a paradise for wildlife. The open oak forest attracted the passenger pigeon, once common in the area, by the account of John Ryckman, who was born near the Bay shore about two miles east of the city of Hamilton in 1798. He related that

". . . there was millions of pigeons which we clubbed as they flew low. I saw 112 killed with one charge of shot."[4] Ryckman also gives some impression of the abundance of other species and their fate:

> Bears ate pigs so settlers warred on bears. Wolves gobbled sheep and geese, so they hunted and trapped wolves. They also held organized raids on rattlesnakes on the mountainside. There was plenty of game. Many a time have I seen a deer jump the fence into my backyard, . . .[5]

On the Bay, waterfowl populations abounded. Thomas McIlwraith, an ardent bird-watcher at Hamilton during the latter half of the nineteenth century, records a fantastically diverse number of species found in the Bay area. However, writing in 1894 he detected a decline in the waterfowl populations.[6]

In the Bay itself, a rich fishery existed. In the Bay's deep water, salmon, whitefish and lake trout were abundant. Crossing the Bay in June, 1796, Mrs. Simcoe relates that "The River [Redhill Creek] and Bay were full of Canoes, the Indians were fishing, we bought some fine salmon of them."[7] The salmon virtually disappeared from Lake Ontario by 1875 and were extinct by 1895. Although a lake trout was netted during a carp control programme in 1951, it is doubtful that remnants of this lake trout population have survived the heavy pollution of the Bay in the past twenty years.

In addition to the cold-water fishery, the numerous ponds and inlets located along the Bay shore must have provided ideal habitat for warm water species, such as bass, pike, and perch. One historian reports that "so famous was Land's Wharf at Emerald Street for its pike and bass fishing that one ardent fisherman frequently walked from Eramosa, thirty miles away, and back with his catch."[8] Patrick Campbell commented on the fishing potential of the Bay while journeying through the area to the Grand River in February, 1793: "We now entered up the Lake Geneva and drove along it on the ice. - Here I saw several Indians of the Messessagoe nation fishing for pickerel, maskanongy, and pike."[9]

Aboriginal Occupation

While the Royal Ontario Museum reports that there is no archaeological evidence to indicate early Indian use of the sandstrip, that is, before 1650, several factors suggest that the area was visited, at least, occasionally. First, as the unique location of the sandstrip serves as a natural passageway along the lakeshore, it is likely that the Indians would have travelled over the sandstrip, proceeding either east or south. Moreover, it has been documented that the sandstrip was virtually at the centre of three Indian trails utilized by successors of pre-1450 Indian tribes.[10] The first trail, called the Mississauga, followed the shoreline from Niagara to York. The second, Brant's Trail, crossed the sandstrip from the northern end, possibly incorporating the Mississauga Trail, then swung west along the northern shore of the Bay, climbing Burlington Heights to strike inland to Ancaster. The third trail turned off from the Mississauga at the southern end of the sandstrip, traversed the site of Hamilton, mounted the escarpment and then headed south to the Grand River and Lake Erie.

Secondly, the abundance of game in the region would have been a strong attraction. Recent archaeological evidence discovered at the Royal Botanical Gardens' nursery on the Bay's northern shore indicates that Indians of the Archaic period (1500 B.C. - 800 B.C.) hunted and fished in the region. Evidence of Indian occupation in the area is lacking for about 2,000 years after 800 B.C. Archaeological evidence of Indians around 900 A.D. at Princess Point has been unearthed. Frank Wood, an amateur historian and archaeologist, reported in 1915 that many prehistoric implements were found near the Redhill Creek, which in the time of the Indians was a good salmon stream, and chipping places and small burying places of one or two graves were found near many parts of its course.[11]

In any case, the likelihood that the beach strip was used by Indians increases after 1450 when the Neutral tribe occupied parts of southern Ontario. Although their territory is not known exactly, this tribe established a village site called Kandoucho, at Lake Medad, near Waterdown. As well as cultivating corn, tobacco, squash, and beans, the Neutrals hunted and fished, and were active in the area until about 1650 when the Iroquois destroyed them. Tradition holds that the decisive battle was fought on the Bay shore, at the foot of Emerald Street. Later the area around Hamilton became part of the domain of the Senecas, who used it only for hunting purposes.

Later the Mississauga Indians, a band related to the Objibwa tribe, occupied the former Neutral territory. When European settlers began to filter into the wilderness around Hamilton after 1780, it was from this tribe that land purchase negotiations had to be conducted. Certainly, the Mississaugas camped on the sandstrip. In a diary entry for June 13, 1796, Mrs. Simcoe writes "The wind being against our going to York we rode on the Beach and had a sweet view of Burlington Bay. We passed the Indian Encampment. Their Hutt and Dogs among the fine Oak Trees they are under formed a picturesque appearance."[11a] Wood confirms that the sandstrip was a popular site to camp while the Mississaugas smoked their catch of salmon:

> The Beach . . . was a great resort of the Indians, who dug pits at intervals along nearly its whole length. A few traces of these still remain (1915). Whether these pits were fortifications or for habitations it is hard to say. Probably they were used for both purposes. The ground around them is burned black with camp fires which have been continually burning there. Stone and flint articles, with a few remains of broken pottery which crumble away at the touch are the only things acquired from these prehistoric sites.[12]

In sum, these accounts of useage of the Bay and beach strip by the Indians suggest that along the proposed QEW route there may be significant finds of archeological interest. The old inlet, and the Redhill Creek area would seem to be areas which, if construction or excavation is to take place, an archeologist might inspect periodically.

Arrival of European Explorers

The first European to explore the region, which came to be known as the Head of the Lake, may have been a Frenchman, Etienne Brule, a lieutenant of Champlain. Dispatched by Champlain in 1615 to enlist the support of Indian tribes south of Lake Erie, Brule likely discovered the beach strip and adjacent Bay while proceeding from the Humber River along the north shore of Lake Ontario. Whether or not he stopped on the site is unknown, for he wrote no account of the expedition.

Brule was followed by a Recollet priest, Father de la Roche Daillon, who conducted a mission to the Neutral Indians during the winter of 1626-27. It is believed that he visited the Neutral village of Kandoucho at Lake Medad. Experiencing little success with the Neutrals, Daillon abandoned the Neutral territory in 1627.

It is not until 1669 that the first account of the Head of the Lake appears. This account is attributed to Father Galinee, a Sulpician priest, who along with Father Casson sought to establish a mission among the Indians south of Lake Erie. Accompanying the priests was Sieur de La Salle. Father Galinee wrote that and "after five days' voyage, we arrived at the end of Lake Ontario, where there is a fine large sandy beach at the bottom of which is the outlet of another little lake discharging itself. Thus our guides made us enter about half a league and then unload our canoes . . . ."[13] The landing site, on the northern shore of the Bay, has been named La Salle Park.

After the visit by La Salle and the Sulpicians, no mention of the region is made for over a hundred years, although the French had established trading posts at Niagara and at the mouth of the Humber River. However, as the remains of European trade goods have been found in local Indian sites, it is likely that French traders and missionaries visited the Head of the Lake.

Settlement at the Head of the Lake

The decision of the Thirteen Colonies for independence from Great Britain in 1777 had important implications for the future of the sandstrip area. Beginning about 1780 a large number of loyal American colonists emigrated to the British territory, soon known as Upper Canada. Unprepared for this substantial influx of settlers, British officials confined their location to specific areas along the border, including Fort Niagara. Soon these settlers at Niagara were petitioning the British government for land grants. The demand for land was so great that on May 22, 1784, the Crown concluded a land purchase from the Mississauga Indians for one-tenth of a penny per acre.[14] This tract extended westward from Niagara along Lake Ontario to Burlington and from there at an angle 45° west twelve miles to the sources of the River La Tranche [Thames] .

On Burlington Beach the line, which ran through the natural outlet between Burlington Bay and Lake Ontario, was later extended by four miles to form the present county line between Wentworth and Halton counties, crossing North Shore Boulevard East near Indian Point. By 1784, the land at the Head of the Lake was legally open to white settlers.

While there is some debate over the identity of the first settler at the Head of the Lake, George Stuart and Charles Depue made the first land claim. Setting off from Niagara by canoe in the autumn of 1785, they paddled along the shore of Lake Ontario until they reached the southern end of the beach strip. A natural channel which curved into the beach at this point made portage easy across the strip into Lake Geneva,* as the Bay was then called. Paddling along the shoreline, they landed at Stipe's Inlet. Depue laid claim by driving into the ground a flattened stake bearing his name. Paddling westward, Stuart claimed land east and west of present Sherman Avenue.

Soon the large number of land claims in the area forced the British government to conduct an official survey of the area; Augustus Jones carried out the survey in 1791.

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*The Indian name for the Bay was Macassa meaning "beautiful waters." Later it was called Big Washquarter, and Lake Geneva. In 1792, Lord Simcoe issued a proclamation renaming the body as Burlington Bay after Bridlington Bay on the northeast coast of England.

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On the 1791 survey map the beach strip is named "Long Beach." Recognizing the strategic locations of the strip by retaining it as a military reserve, British officials refused land grants to this area.

The first major development at the beach strip was the construction of the King's Head Inn in 1794. Fearing the American presence to the south, Governor Simcoe planned to relocate the capital of Upper Canada, then at Niagara, at the present site of London. A road was planned to link this interior capital with the rest of the province with its eastern terminus and a garrison at Dundas. Although the King's Head Inn was built ostensibly for the "accommodation of travellers," its location on the shore of Lake Ontario "was not without reference to a military position."[15] As relations between Great Britain and the United States deteriorated, the Inn became an important "depot for stores and provisions, as well as a rendezvous for the militia and such other troops as it might have been found expedient to have stationed on the line of communication between York and Detroit and Niagara . . . .[16]

The King's Head Inn stood about two hundred feet from the Bay shore near a curving arm of Red Hill Creek near the present Windermere cut-off. Throughout Upper Canada, the inn's oval sign became well known - on one side the bewigged head of the king surmounted by a crown, with the legend "George III - King of Great Britain," and on the reverse "King's Head Inn, 1794." The structure itself was a large two-storey frame house of eight rooms with two low rear wings joined to the main body by a colonnade. The location must have given a particular charm to the Inn, as Mrs. Simcoe testifies "It is a pretty plan. I breakfasted in a Room to the S.E. which commands the view of the Lake on the S. shore of which we discern the Pt.of the 40 Mile Creek, Jones Point, and some other Houses: From the rooms to the N.W. we see Flamborough Head and Burlington Bay. The Sand Cliffs on the N. shore of Burlington Bay look like Red Rocks."[17]

Four years after the completion of the King's Head Inn, Joseph Brant, one of the most illustrious figures of the period, received a land grant of 3450 acres at the northern end of the sandstrip. Chief of the Six Nations Tribe, Brant, or Thayendanegea as he was known, received this grant from the British Crown for distinguished service during the Revolutionary War. Using Fort Niagara as a base, Brant had led his warriors on commando raids into the Mohawk and Ohio valleys. After the War, Brant became an eloquent spokesman for the rights of his Mohawk people, who had migrated to the Grand River area. His rationale for selecting the site at Burlington is not clear, although as a military man he must have been well aware that the tract commanded the approaches to both the beach strip and Burlington Heights.

On his land at Burlington, Brant built an elegant Georgian-style frame house. James Buchanan, British consul at New York in 1819, described the house. From the shores of

Lake Ontario five miles away, he saw the house "which had a very noble and commanding aspect . . .. Driving up to the door we alighted and . . . proceeded into the parlour. It was a room well-furnished, with a carpet and pier and chimney glasses - mahogany tables, fashionable chairs, a guitar and a neat hanging book-case . . . ."[18] In a period when the log-cabin was the common structure, Brant's mansion must have been exceptional, especially as he had red cedar logs for the interior finish shipped from the Thousand Islands in the St. Lawrence.

During Brant's tenure at the north end of the Beach strip, the shore became a favourite camping ground of the Indians. On May 1, 1800, it is reported that one thousand Indians gathered at the housewarming to honour their chief. His comfortable quarters were also enjoyed by the many European travellers.

After Brant's death in 1807, the house became the property of his children. Although the records are somewhat unclear, it appears that his descendents retained ownership of the property until 1875, when the Brant House, as it came to be called, was converted to a summer resort. The three-storey house with its long verandah on two sides, its many gables, and its individual apartments became a fashionable vacation resort. In 1899 the property was sold to A. B. Coleman, who erected in 1902 adjacent to the Brant House the Hotel Brant which was outfitted with the most modern conveniences of the day. In 1917, the Canadian government purchased the Hotel Brant property for soldiers' hospital. In the 1930's the Brant buildings were demolished, but through the efforts of T. B. McQuesten, the Brant House was reconstructed in 1942 to serve as a museum and memorial to the colourful Joseph Brant.

The Beach Strip and the War of 1812

During the War of 1812, the beach strip was the site of several engagements between the invading American forces and the British defenders. The first confrontation took place on May 10, 1813, when the American commodore, Isaac Chauncey, despatched two armed schooners, the "Governor Tompkins" and "Conquest" to Burlington Beach to destroy the King's Head Inn and its stores. Major Samuel Hatt and his sixty-three soldiers were soon overwhelmed by two hundred Americans, supported by cannons from the schooners. The Inn, together with its military supplies and troop transport boats, was destroyed.

Local tradition maintains the Mrs. Bates, daughter-in-law of the Inn's proprietor, was so angered by the destruction of her home and personal property that she rowed out to the American ships anchored offshore. Confronting Commodore Chauncey, she demanded the return of all household goods and compensation for those destroyed. According to the story, so surprised was Chauncey by this fearless woman that not only did he return her belongings, but he also paid the indemnity.

The American fleet under Chauncey appeared again briefly at the sandstrip on July 29, 1813. On this occasion, Lieutenant-Colonel Winfield Scott led a party of several hundred to attack the British camp at Burlington Heights. However, learning that the British had anticipated the attack, Scott destroyed a redoubt near the old outlet, reembarked his men, and sailed for York.

Two months later, on September 28, 1813, one of the most significant naval events occurred off the beach strip. Although the major campaigns in Upper Canada were carried out on land, the waterways were critical to control of the land. When the British fleet of two ships, two brigs and two schooners was badly damaged by the superior American force of two ships, three brigs, and six schooners at York, the British commander, Sir James Yeo, sailed for shelter at Burlington Bay to save the fleet. In a rising easterly gale, the American squadron under Chauncey gave pursuit. As the British ships neared the sandstrip, Yeo, making a desperate decision, determined to run his ships through the narrow natural outlet on the beach strip, guided by the chief pilot, James Richardson. Fortunately the heavy easterly gale had raised the water level at the western end of the lake sufficiently to permit the "Royal George" (510 T.), the "Wolfe" (637 T.), the "Melville" (279 T.), the "Earl Moira" (262 T.), the "Sir Sidney Smith" (216 T.), and the "Beresford" (187 T.) to gain the protected harbour. Fearing the intensity of the gale, Chauncey set sail for Niagara, never learning the fate of the British ships.

Secure in the protection of the Bay, the damaged fleet was repaired with the assistance of the garrison at Burlington Heights. However, the problem of returning the fleet to action had to be surmounted for only with an easterly gale would water depth in the shallow outlet be raised. With the next full moon came an easterly storm, piling the water up along the beach and deepening the outlet. The smaller vessels were pulled through the channel and anchored. After all the guns and equipment from larger ships, the "Wolfe" and "Royal George", were unloaded, the anchors of the two vessels were planted deep in the lake. With hundreds of sailors heaving the capstans around, the ships were dragged slowly through the channel. Hence the British fleet, and British power, in Upper Canada was ensured by the presence of the beach strip. For his remarkable guiding the ships through the shallow outlet, Richardson was awarded £100 in 1815 by the Loyal and Patriotic Society for "his uncommonly good conduct."[19]

Construction of the Canal

Perhaps the most significant event to occur at the beach strip was the construction of a canal. As commercial activities increased after the War of 1812, it became evident that a canal was needed to permit ship entry from Lake Ontario to the Bay. When asked by Robert Gourlay in 1817 what factor most inhibited the growth of their township, the residents of Barton Township replied

> The want of a cut through the beach to the lake Ontario. This concerns the district, and the upper part of the province materially, insomuch as a safe and commodious harbour would then be found in the heart of the country, of much importance in time of war, as it would lead to a safe communication across the peninsula to Lake Erie.[20]

In a similar report the Salfleet Township residents claimed that

> . . . a canal might be easily cut through the long beach which separates Burlington bay from lake Ontario . . . the distance not exceeding one-fourth of a mile, and the height above the water not more than eight or ten feet, composed wholly of a fine sand . . . and the bottom of both lakes indicating nothing more to resist than clay, the accomplishment of which would be an object of no less importance to the government than to the people.[21]

The government, recognized the value of a canal at Burlington Beach, for on March 19, 1823, an act of Parliament authorized construction of a navigable waterway through the sandstrip. This new canal was built in the present location of the Burlington Canal, south of the natural inlet which was filled in. The work was done chiefly by pick and shovel wielded by an army of labourers under the direction of Captain John McKeen and James Strowbridge. Originally, the width of the canal was only 30 feet.

Accounts of the canal construction are conflicting, although it appears that the work was completed initially in 1826 at a cost of $94,000 by the firm of Spohn and Man. However, an act of Parliament on February 17, 1827, provided

for a survey of the canal works and for aid to complete them, indicating that further work was required. Possibly lake gales and winter ice damaged the canal. In any case, William Kerr, superintendent of the canal, was required to make extensive renovations in 1828. In a report to the canal commissioners, he stated that

> I . . . put the Drudging machine in repair, and commenced deepening the Canal about the 10th May . . . and by the 10th June, I discontinued the Drudge, having a depth of water averaging twelve feet through.
>
> I then began repairing the south pier which was in a very Shattered State – I carried it out 800 feet upon the foundation laid by Mr. Hall [first superintendent] 200 feet of it had been washed away six feet below the surface of the water and the other 600 feet I took down principally to the water level – which I have tied with timber of one foot square fastened with two inch treenails 22 inches long.
>
> The whole 800 feet are perfectly filled with heavy stones, 700 feet of this pier I have decked over with 2 and 3 inch plank, crossing the top ties at every four feet – well spiked with seven inch spikes – with heavy oak gunwhales on both sides . . . secured with treenails and iron bolts, 22 and 16 inches long.
>
> To protect the foundation of the pier 40 cords of logs from the Islands below Kingston were deposited on the ascent upon the pier. The north pier was similarly repaired and 600 feet that had been washed away renewed.[22]

The cargo-ship, "Rebecca," owned by John Chisholm, is reported to have been the first vessel through the canal. Interestingly, Chisholm was appointed as customs and toll collector at the canal. By 1829, a steamer, the "John By," made regular runs between Hamilton and York.

Commercial development accelerated along the beach strip. John Galt, founder of the Canada Land Company, recognized the commercial potential of the site when he applied to the Crown for land at the site to "establish a depot . . . on the banks of the Burlington Canal . . . so that supplies . . . and immigrants could be brought so far by water."[23] To handle the cargoes brought into the port, wharves and freightsheds were constructed along the Bay side of the beach. A ship-building yard was established on the shore by Philip Magee, who launched the first ship built at the canal on May 11, 1831. This schooner was christened the "Daniel O'Connell of Burlington Canal."

Initially, scows ferried travellers and their goods moving north and south across the canal. However, upon the recommendation of William Kerr, a swing bridge was built in 1830. This forerunner of the modern lift bridge at the canal was in operation only briefly, for with the widening of the canal in 1832, transportation across the passage reverted to scows. In 1846, a second widening of the canal allowed larger vessels to enter Hamilton, fast becoming a major port on the St. Lawrence waterway.

A frame lighthouse was erected in 1838 to guide mariners to the canal entrance. On July, 1856, a passing steamer, the "Ranger," showered sparks on the pier, setting fire to the lighthouse, the ferry house, and the lightkeeper's two buildings. Although a pier light was installed in

September, 1856, it was not until June, 1858, that a new stone lighthouse, employing coal oil lamps, was built. This structure still stands near the railway and traffic light bridge on Lakeshore Boulevard.

Recreation at the Beach

As Hamilton became the chief port and distributing point for the lakehead district, the beach strip and adjacent Bay assumed new importance. In the summer, the beach area became a centre for water recreation. Boating, swimming, picnicing, and fishing were popular activities. In the winter, iceboating (begun in 1836), curling, skating, sleighing and icefishing focused the Bay as playground for the city of Hamilton.

In 1876, the Hamilton and Northwestern Railway line was constructed across the beach. A large iron bridge was erected for passage over the canal. Later, in 1897, a radial electric line, including a second bridge over the canal, from Hamilton to Burlington was completed. Wooden side-walks were raised along the edge of the bridge to permit pedestrian traffic across the canal.

The effect of the transportation development was to alter radically the pastoral nature of the beach strip. Vacationers from the local district as well as wealthy Americans arrived in crowds. To cater to this market, a host of hotels appeared, including Wells' Tavern, the Sportsman's Arms, the Corey House, Dynes Hotel, Perry's hotel,

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Martin's Pleasure Gardens, and the Baldry Hotel. The trade evidently was lucrative, for, when the Baldry Hotel burned in December, 1874, the plush Ocean House quickly replaced it the following May. This three-storey resort featured a dance hall, a music salon, a bowling alley, a billiards parlour, and a boat livery. With the beach strip becoming a fashionable residence of affluent Hamiltonians, the Royal Hamilton Yacht Club was built near the canal on the bay side. Regattas staged by the Club sometimes drew 20,000 spectators. Special excursions and moonlight cruises, begun in the 1870's, were a further attraction for the area.

However, the exclusive character of the Burlington beach resort gradually declined. First, it appears that water quality in the Bay began to deteriorate. As early as 1894 T. McIlwraith, the amateur ornithologist, suspected that sewage and oil waste were responsible for a large kill of white-winged scoters on the Bay. James Smith, a local resident, reported that "up to 1914 bay water was wonderful. Swimming was our greatest sport. Then I left Hamilton. When I returned in 1922, they were talking pollution."[24] By 1925, the water quality, and consequently, recreation on the Bay, began a decline which has not been reversed.

Certain major developments along the beach strip further served to degrade the pristine quality of the environment. In 1908, a line of hydro towers was erected across the beach

forcing removal of many lakeshore cottages. Then in 1923, the dirt track across the beach was replaced by a paved highway: cottages soon lined the length of the shore, and visitors swarmed on the beach. Many summer residences were converted to permanent homes. As a result the pastoral landscape of the sandstrip disappeared.

Today it is doubtful if Joseph Brant would recognize the landscape at the Head of the Lake. The pond which once provided a sheltered landing area in front of his house has been completely filled. The QEW now cuts the western edge of this pond. The Burlington Sewage Treatment Plant is built on the southern edge of the pond, while the Ontario Department of Transportation and Communications yards are situated in the middle of Brant's pond.

In less than two hundred years the Burlington beach strip has been transformed from an Indian trail into a high-volume transportation corridor, and the Bay from a highly productive fishery to a waste lagoon. In this evolution, most of the historical value and cultural heritage of the beach strip has been neglected or forgotten. If the next construction effort can become a tool for both preserving and enhancing the physical and cultural environment of the strip, the 1970's can be the crucial decade for the residents of Hamilton and Burlington in their quest for a quality environment.

Endnotes

1. Anna Jameson. Winter Studies and Summer Rambles, Toronto: McLelland and Stewart, 1965, p. 18.

2. M. Q. Innis, ed., Mrs. Simcoe's Diary, Toronto: MacMillan Company, 1965, p. 173.

3. Ibid., p. 182.

4. Mabel Burkholder, The Story of Hamilton, Hamilton, 1938, p. 73.

5. Quoted by T. R. Woodhouse in "An Address to the Head of the Lake Historical Society," Hamilton, Ontario, April 10, 1959.(Hamilton Public Library).

6. Thomas McIlwraith, The Birds of Ontario, Toronto, 1894.

7. Mrs. Simcoe's Diary, p. 182.

8. Marjorie F. Campbell, A Mountain and A City: The Story of Hamilton, Toronto: McLelland and Stewart, 1966, p. 87.

9. Burkholder, p. 73.

10. The two sources for information on the Indian trails are Marjorie Campbell, A Mountain and A City; Story of Hamilton, and Royal Botanical Gardens, "History of Cootes Paradise."

11. Frank Wood, "Indian Relics and Implements," Wentworth Historical Society Papers and Records, VI, 1915.

11a. Mrs. Simcoe's Diary, p. 184.

12. C. M. Johnston, The [illegible] of the Lake, Hamilton: Wentworth County Council, [illegible], p. 7.

13. Johnston, p. 14.

14. Campbell, p. 21.

15. Mrs. Simcoe's Diary, p. 182.

16. Barbara Ford and Claire Emery, From Pathway to Skyway: A History of Burlington, Confederation Centennial Committee of Burlington (Ontario), 1967, p. 27.

17. Mrs. Simcoe's Diary, p. 182.

18. Ford and Emery, p. 17.

19. Campbell, p. 44.

20. Robert Gourley, Statistical Account of Upper Canada, I. New York: Johnson Reprint Corporation, 1966, p. 394.

21. Ibid., p. 401.

22. Campbell, p. 64.

23. Johnston, p. 123.

24. Campbell, p. 176.

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AMENITIES

The description which follows is a qualitative evaluation from north to south of the present state of the study area, principally done by S. G. Rich, and C. Kitchen, with an appraisal of how impact of new construction might further aggravate or improve amenity resources. Noise studies are to be carried out as separate engineering surveys, hence only visual amenities are discussed here.

The present high quality housing, adjacent to the QEW between high.403 and the Burlington Canal would appear to be visually (and probably from a noise point of view) disadvantaged by the present QEW. If a new interchange is constructed to handle traffic at 403 and the QEW, including an enlarged QEW R. O. W.; an 8 foot high berm topped with coniferous and hardwood trees and shrubs would appear to be desirable to prevent or reduce complaints from residents. Species of trees resistant to air pollutants and salt spray should be planted. Such a berm if built prior to actual highway relocation and construction would be helpful to these residents since air hammers, heavy trucks, etc. during construction can be as troublesome as traffic; it would be tangible evidence of concern by MTC for the residents. Depression of part or all of the new highway would be equivalent, more or less from a visual point of view, to berming. Some combination of depression and berming may also be feasible.

The valley leading into the Bay at Indian Point is a major amenity to travellers and residents. It should be retained, and highway construction moved eastward to leave it unimpaired.

The present bridge or Skyway dominates the view from Beach Boulevard, and from this ground level perspective can be considered a disamenity (negative amenity); at a distance it is not as over-powering. The Bay and Lake from the Skyway, however, are attractive; hence the various amenity viewpoints might be seen as depending upon whether you are viewing from the bridge or to the bridge.

In view of the heavy residential and recreational use of the beachstrip, we would suspect the Beach Boulevard users would favor a tunnel rather than an enlarged bridge, which would further intrude on this very narrow crowded strip of land. A compromise might be to double deck the present bridge, assuming a tunnel is not possible, with autos carried on a new top deck. The Toll Plaza could be removed to compensate, from a noise point of view, for the increased roadway capacity somewhat higher in the air.

If a tunnel is feasible, the roadway surface areas under and near the present bridge might become "surplus" Crown lands. Since a tunnel with the present bridge removed would in our view result in substantial improvement in residential property values, this "surplus" land if combined with adjacent residential lands would then constitute a significant land area of high quality and high value. The Provincial government might consider redevelopment of the whole area as a unit, reserving some of the space as a possible "Joseph Brant Heritage Park", combining his museum with other features of historical, recreational, education, and cultural interest in this area, such as the Canada Centre for Inland Waters, the old light house, the Burlington Canal and the beach itself. Beach housing between Brant's Museum and the Canal is not of high quality, hence will have to be replaced in whole or in part in the next few decades in any case.

In the area between the Canal and Stoney Creek Circle, the Toll Plaza, the new fill into the Bay, the housing and commercial strip along Beach Boulevard, the Hydro towers, the industrial and institutional buildings, the railway, and the guard rails, etc. all detract from a possible high quality view of the Bay, marshes, and Lake Ontario. Confederation Park, the Redhill Creek marshes, and what is left of the unfilled Bay are the only blue and green oases in this fast flowing area of greys, brown, and whites. The mature cottonwoods between the QEW and the beach help to screen the old housing from the auto user in summer. As these trees begin to die, it might be expected that the view by the highway and Skyway user will continue to deteriorate. The death of these trees is likely to cause serious amenity problems for the beachstrip residents. Though the dwellings are predominantly old and in poor condition, there are a number of good new dwellings and well maintained older ones. Assuming that residential use will continue, consideration should be given to a rehabilitation program which would include the

replacement of the dying cottonwoods by other suitable species.

The proposed Redhill Creek exchange will in our judgement further degrade the visual amenities along this strip, because it will eliminate the last remaining cattail marsh and the strip of woody vegetation along the creek banks. If no alternative is possible, then constructing new cattail marshes from borrow pits near to the present marsh would at least provide equivalent green oases and wildlife nodes. Tied to Confederation Park by an overhead walkway or cable car system, the present or new man-made marshes could become a green gateway to Hamilton, rather than the present industrial-landfill-old housing image the westbound traveller receives. In addition, such marshes could be useful for wildlife education and water quality improvement from upstream drainage.

If the Redhill Creek interchange could be amalgamated into the Burlington Street or Stoney Creek ones, a major negative environmental factor would be eliminated from the proposed new highway. Consolidation of Confederation Park on both sides of the highway, and developing parking space on the west side of the QEW with overhead access to the park would increase the space available for other types of beach-oriented recreation activities, thereby compensating for any additional land occupied by the new highway in the vicinity of Confederation Park.

A number of possibilities for the improvement of the amenity of the study area have been suggested. The social value of screening can be enhanced, if it can be done prior to highway construction. The combination of the traffic exchanges at the south end of the study area, and a re-appraisal of the need for all of these exchanges can minimise the impact of construction. The need for concern and the suggestions offered for the environmental improvement of the Redhill Creek - Confederation Park area should be considered in the design stage as having a priority at least equal to the usual considerations of efficient traffic flow and construction economics. Apart from the obvious amenity advantages of a tunnel to replace the existing elevated structure, this alternative is likely to have significant effect on land values and development possibilities. Any cost-benefit study of the tunnel alternative should include an estimate of the value of improved amenity, changed land values, and new development possibilities.

WILDLIFE OBSERVATIONS

The abundance or scarcity of avian wildlife is an indicator of the quality of a natural area; an abundance and variety of species creates, as well, pleasure for those who enjoy viewing or feeding animals. To determine the overall status of faunal species, we conducted a wildlife reconnaisance of avian species at selected points along the QEW, Beach Boulevard strip, and the Bay.

Methodology

Three clear spring and early summer mornings, without wind, were selected (June 18, 29, and July 5, 1972) for observations. Birds observed by telescope and binoculars in the marshes or on the water, flying over or heard calling, were recorded at 7 points (see Figure 1) from ½ hour before sunrise to 1 and ½ to 2 hours after sunrise. About 10 minutes were spent at each point. Because of the long distance between point number 1 on the shore and the hydro towers set out in the Bay, which serve as a resting area for gulls and terns, we experienced some difficulty in determining the species of gulls and terns using the Bay, especially the immature gulls.

Results

Table 1 depicts the species found at each observation point for the three dates. Points one and two are dominated by

FIGURE 1

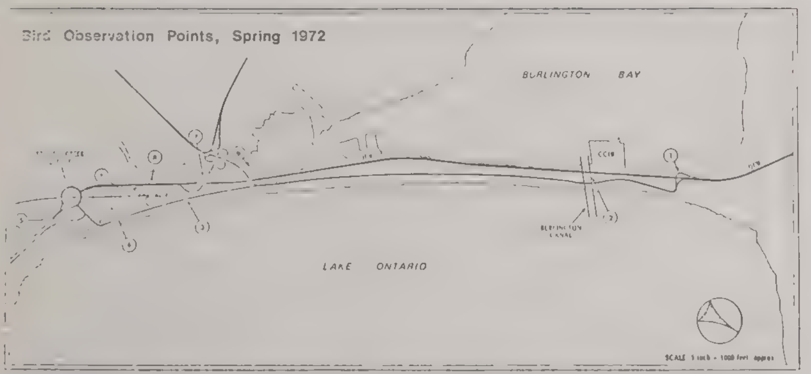
Bird Observation Points, Spring 1972

TABLE 1 Birds Observed at 9 Stations Along Hamilton Bay and Beach Strip, Shortly After S[illegible]

Observation Point	June 18, 1972 Species, Numbers Seen & Heard	June 29, 1972 Species, Numbers Seen & Heard	July 5, 1972 Species, Numbers Seen & Heard
1	Herring & Bonapartes Gull(50 ±) Common Tern ([illegible]) Red Wing Blackbird (40±)	Herring &Bonapartes Gull(200 ±) Common Tern (25) Red Wing Blackbird (12est)	Herring & Bonapartes Gull([illegible] ±) Common Tern (38) Starling ([illegible]) Tree Swallows (2)
2	Herring Gull (150±)	Herring Gull ([illegible]0 est)	Herring Gull ([illegible] est) Starling ([illegible]) Grackle ([illegible]) Pigeon (1)
3	Red Wing Blackbird (25) Green Heron (1) Black Tern (1)	Red Wing Blackbird (16) Grackle ([illegible]) Starling (1) Florida Gallinule (1) Robin (1)	Red Wing Blackbird (40) Black Tern (2) Starling (1) Florida Gallinule (2) Robin (1) Mallard (1 & Brood of 6) Pheasant (1)
4	Mallard Duck (♀ & brood of 6) Grackle (25±) Robin (6) Starling (12) Red Wing Blackbird (2) Pheasant (7)	Mallard (4) Grackle (20) Robin (1) Starling (10) Black Tern (1)	Grackle (10)

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(Continued)

Observation Point	June 18, 1972 Species, Numbers Seen & Heard	June 29, 1972 Species, Numbers Seen & Heard	July 5, 1972 Species, Numbers Seen & Heard
#5	Mallard ([illegible])	Mallard (18 & 2 Broods of 7 each)	Mallard (1 & Brood of 8)
	Blue-Winged Teal (1)	---------------	---------------
	Red Wing Blackbird (16)	Red Wing Blackbird (16)	Red Wing Blackbird (20)
	Grackle ([illegible])	Grackle (12)	Grackle (12)
	---- -------	---------------	Starling (2)
#6	Green Heron (2)	Green Heron (2)	Green Heron (1)
	Red Wing Blackbird (16)	Red Wing Blackbird (4)	Red Wing Blackbird (2)
	---- -------	Pheasant (1)	---------------
	---- -------	Black Tern (1)	---------------
	---- -------	---------------	Starling (1)
	---- -------	---------------	Sandpiper species ? (1)
#7	Meadow[illegible] (1)	---------------	---------------
	Red Wing Blackbird (6)	Red Wing Blackbird (4)	Red Wing Blackbird (4)
	---- -------	Kildeer (2)	---------------
	---- -------	---------------	Grackle (1)
#8	Mallard (1 & Brood of 9)	---------------	---------------
	Blue-Winged Teal (2)	---------------	---------------
	Red Wing Blackbird (80 ±)	Red Wing Blackbird (80 ±)	Red Wing Blackbird (40 ±)
	Black Tern (2)	Black Tern (4)	Black Tern (1)
	---- -------	Green Heron (1)	Green Heron (1)
	---- -------	Starling (30)	---------------
#9	Starling (2)	Starling (1)	---------------
	Kildeer (1)	---------------	Kildeer (1)
	---- -------	Red Wing Blackbird (1)	---------------

fish-eating birds (gulls and terns), which feed over deep water. Birds seen at points three, four, five, six, and eight are typical of marshes or shallow aquatic ponds, while the birds at points seven and nine are typical of terrestrial urban areas severely modified, that is, by landfill, lawns, or heavily polluted water-land interfaces.

Discussion

Comparison of food chain structures of undisturbed marshes in Ontario with marshes and ponds at observation points three, four, five, six, and eight suggests that land filling for the present QEW, by park managers in Centennial Park and by the city, and storm water drainage into the Redhill Creek have altered the natural fauna. The absence of species, such as coots, rails, marsh wrens, wood ducks, pied-bill grebes, implies that the vital interface between open water and bullrushes, cattails and sedges, and certain insect production processes have been altered by man's activities so that these birds can no longer survive. The possible conclusion is that, if wildlife is to be maintained in the face of increasing transportation needs, the remaining marsh areas, especially the best marsh which is at the terminus of Redhill Creek demand special design attention in regard to maintaining the depth of water and the critical transition zone of cattails and bullrushes.

The uniqueness of this marsh should be emphasized. Naturalists know that this marsh attracts many birds moving along the Lake Ontario shoreline and affords pleasure for viewing close to an urban corridor. In addition, it provides a sediment and organic decomposition basin for storm drainage entering the marsh from urban areas upstream. Destruction of the marsh will further deteriorate the Bay water, although the precise quantitative nature of the marsh's beneficial action is not possible to determine without costly water quality studies. Urban storm water with its high loading of sediment and organic material is an important contributor to water pollution, based on a few studies in North America.

If these remnant marshes are destroyed by highway and interchange construction, their replacement by excavation of equivalent borrow pits requires consideration. Sandy soils overlying clay in the vicinity of Stoney Creek Circle lend themselves to such marsh reconstruction activities with proper sloping of the edges to insure sedge, cattail, and bullrush stands intermixed with open water. Structurally, such man-made marshes would tie into the pond-land mix in Confederation Park.

WATER QUALITY

This section summarizes the present status of water quality in the Burlington Bay, streams, marshes and adjacent areas of Lake Ontario. In addition, from the review of their water quality status, and dynamic interactions, some estimates can be made of impact from the proposed QEW construction. Remedial strategies for counteracting undesirable side effects can then be pursued.

Burlington Bay, triangular in shape, has an area of 11.3 square miles and a watershed of 190 square miles with a volume of 10^{10} cu. ft. and an average depth of 20 feet. The total water input to the Bay at present is made up of approximately 60 per cent runoff and 40 per cent "used water," the latter being the sum of the effluents from sewage treatment plants. The average theoretical detention time is 1.4 years. The Bay generally flushes into the Lake in fall.

The heavy industries and municipalities by dumping their wastes into the Bay, pollute it.[1,5,6] However, the Bay functions as an important "waste-treatment-reactor" by protecting the adjacent part of Lake Ontario from elements which contribute to eutrophication. Current efforts to reduce pollution inputs from industrial and municipal sources might improve the condition of the Bay.

There are four creeks in the study area; two discharge directly into the Bay.

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Grindstone Creek: An area of 34.4 square miles, the creek flows through Waterdown into the west end of the Bay. Since most of the land in the watershed is used for agriculture, phosphates and nitrates are fairly high in the creek, but the water quality data do not indicate any gross pollution such as might be found in urban or industrial areas. Water quality data for the creek during the period January 1971 to December 1971 are in Appendix 1.

Redhill Creek: Having three main branches, this creek, its source in a small watershed on top of the escarpment near a large sanitary landfill, carries large quantities of pollutants such as ammonia, chlorides, coliforms, and organic matter. Just above King Street, the creek received storm overflow from a large sewer system, and below from several small storm sewers. Another source of pollution is the sanitary landfill operations near the marsh and mouth of the creek. Just above the point of its discharge into the Bay and below the marsh, it receives the wash water flow from the water purification plant, and subsequently the effluent from the primary sewage treatment plant. Since the natural flow of the creek is small, except during spring runoff, the lower portion of its channel is almost always filled with sewage effluent. Suspended solids, settled out from the sewage treatment plant processes, are also discharged into the shallow basin, where they undergo active decomposition. The water from this basin diffuses and mixes with the adjoining Bay water. Water quality data are in Appendix 2.

Spencer Creek: With several tributaries, the creek drains the larger portion of the total watershed to the west of the Bay and supplies the largest portion of relatively natural water input to the Bay through the marsh area (Cootes Paradise) above Burlington Heights. Water quality data are in Appendix 3.

Stoney Creek: Rising in two small branches on the escarpment, the creek enters the pond in the centre of Confederation Park. Two small lagoons (east and west) are usually separated from Lake Ontario by a sand bar. During periods of high water level, the water in the lagoon escapes into the Lake by cutting a channel through the sand.

The pond receives the drainage from the ditches of the industrial area south of the QEW. Ammonia, nitrates, and phosphates were appreciably higher in the summer months. The coliform counts 50 per cent of the time were found to be within the acceptable level set by the OWRC.

Hamilton Bay: Chemical and bacteriological characteristics of the Bay as given in "An Environmental Appraisal of Halton and Wentworth Counties"[2] are in Appendix 4.

From the bacteriological point of view, the condition of the Bay is improving significantly as a result of the Hamilton primary treatment plant and the chlorination of the effluent. In the west end and along the north shore, the water most of the time meets the requirement for bathing waters. Near the present effluent outfall and along the industrial shore, much higher coliform populations occur frequently.

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The dissolved oxygen content is decreasing from year to year, while chlorides, and turbidity are increasing in the Bay water. The high ammonia content appears to be on further increase.

There is a high concentration of iron-bearing wastes also entering the Bay. The mixing of these wastes with the phosphate rich water in the Bay results in the precipitation of phosphates. Thus the phosphate level in the main portion of the Bay is kept low, aiding in the minimum contribution of the phosphates into the Lake Ontario water.

Thirteen species of macroinvertebrates were found in the Bay; 9 were Oligochaetes.[3] Within this group, Limnodrilus hoffmeistri, L. cervix, and Tubifex tubifex comprised 92 per cent of total numbers of specimens. The dominance of L. hoffmeistri in the Bay indicates areas of pollution or organic enrichment of the mud.

Burlington Canal: The water quality characteristics are in Appendix 5. The water quality at the canal zone shows improvement compared with that of the Bay water. The combination of more favourable water chemistry, circulation, and moderately rich sediments near the canal gives the area a higher biomass of Oligochaetes compared to the much richer Bay. The flow in the canal is sometimes of an oscillating nature, moving back and forth. These movements may be of diurnal or seasonal nature.

Lake Ontario - Western End: The western end of Lake Ontario is relatively unpolluted. Evidence from the daily analysis of water taken from the Lake intake at the purification plant shows that the water flowing through the Burlington Canal is the largest local source of pollution, and depending on the water circulation, it can produce sudden peaks of ammonia in the water works intake.

The Oligochaete T. tubifex are distributed in the lake only in the plume of richer sediments projecting from the mouth of the canal. The plume is less densely populated with sphaeriids than are the sediments south of the plume. The maximum population of chironomids are found at the mouth of the canal in the lake with a preponderance of Chironomid attenuatus, the common chironomid in the Bay. Most of the Oligochaete species of the Bay also are found at the mouth of the canal. The distribution T. tubifex within the plume of richer sediments extending into the lake from the canal and the poorer populations of sphaeriids within the plume are probably related in part to pollution by Bay water. However, the distribution pattern of macroinvertebrates at the plume and within the western end of the Lake indicates how the dilution effect of the Lake water operates.

According to the study on "Circulation and water Quality of Western Lake Ontario,"[4] the emissions from Burlington Bay are the main source of pollution in the lake. These tend to be concentrated on or near shore; east winds move polluted water towards the shore, but cold water upwelling caused by westerly winds appears to trap polluted water in a narrow band along the beach. The same study points out that, when the Lake is calm and currents weak, the polluted water moves in discrete masses in the shallow water where they are not rapidly diluted. The evidence is that currents are strongly controlled by the wind so that subsequent surges of water-bourne effluent from the Bay are not at all regular. However, in summer, this motion is concentrated in surface layers due to thermal stratification. When the lake is homothermal (uniform temperature) in the winter, spring, and late fall, emissions from the Bay are distributed from surface to the bottom and hence can appear at the drinking water intake in high concentrations.

Conclusions

1. Erosion due to highway and interchange construction activity may fill up the Stoney Creek ponds; these ponds could be restored by dredging.

2. Loss of the Redhill Creek valley and marshes will be detrimental to water quality in the Bay since the marsh likely acts as a living filter or buffer for sediments and nutrients coming in from above.

3. Distribution of the macroinvertebrate population and information on the water quality data for Hamilton taken at the raw water intake show the considerable dilution of the Bay water by the Lake.

4. Water movements at this western end of Lake Ontario are difficult to predict and are not regular because of the influence of winds from varying directions, and also from the upwelling of cold bottom water under the influence of westerly winds.

5. The raw water intake pipes are approximately located in or at the hypolimnion, which is the cold water zone in summer lying beneath the upper warm water zone. If as much of the construction activities as possible can be made during the summer (June-September) when the lake is thermally stratified, it will keep silt, ammonia, etc. above the intake pipe. In the late fall, winter, or spring, when the water is homothermous, or uniformly mixed, silt, etc. may be brought into direct contact with the intake pipe. Construction near watercourses or in the Bay at this time could result in some problems in city water quality control. If interchange construction, streambed alterations, and any Bay filling could be done in summer, prior to the general fall flushing of the Bay, this potential contamination of Hamilton's drinking water supply could be reduced in magnitude. Construction activities not contributing silt to Bay, Lake or stream courses, or not stirring up Bay muds do not have to be seasonally regulated.

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VEGETATION RESOURCES

Introduction

The vegetation resources visited and described in this study were those areas having some form of tree cover. As much of the area examined is residential, the vegetation planted by man is primarily for reasons of aesthetics. There is also considerable age variation in the residential planting. Other significant vegetation components are active and abandoned orchard lands, shelter belts, and farm homesite plantings. There are also several large contiguous blocks of natural forest cover, generally related to the numerous streams and drainage ways which are found in the study area. Finally there are several small planted areas along the highway.

Few, if any, areas might be described as being ecologically unique in the sense that they display natural qualities which have not been affected by man since 1800. frequent human impacts These include logging, grazing, introduction of exotics, and vandalism by children.

Methodology

Due to the small and scattered nature of the forest cover in the study area, no attempt was made to quantitatively analyze the various stands. The approach used was primarily descriptive or qualitative in nature. The stands were visited on foot, numbered, and described in respect to species, age, and condition. It was difficult to describe and delimit many of the woodlands because they frequently were collections of scattered trees along fencelines, in old pastures, or along streets and highways.

Findings

The vegetation resources in the study area can be divided into urban and aesthetic plantings, agricultural plantings, and "natural" or "semi-natural" stands. Contrasted to the original forests principally of oak, hickory, chestnut and white pine, or maple, beech, and white pine none of the natural forests have escaped considerable alteration since Caucasian settlement. The description of each forest unit and its location are at the end of this Chapter, and are illustrated in Figure 2. Table 2 classifies the stands as to their origin as urban plantings, agricultural plantings, aesthetic plantings, or natural stands.

The cottonwood trees which predominate in unit 51 are generally mature in age; many are decadent and can be expected to die in the next 5 to 15 years. Of the natural areas, units 14 and 33 are reasonably diversified and all-aged stands (a healthy and natural condition). Unit 33 also is a significant buffer between the present QEW and the housing to the west. Unit 67 although heavily vandalized by children, could be rehabilitated with some planting and pruning. The Redhill marsh and ponds are not shown on the vegetation map; they are discussed in the chapter on wildlife as significant natural features.

The visual characteristics of the study area, in terms of native vegetation, have been almost totally altered and decimated. Since the original forests of 1800 were mixed hardwoods and white

pine, and since they were some of the most beautiful forests in southern Ontario, it would seem to be important to not only preserve the few remnants in floodplains and on slopes, but to reintroduce native vegetation where possible to return the region to some visual state in harmony with its past history, and its potential natural beauty. Within the latitude provided by species resistant to salt, air pollutants, and rabbits, are many species which could form the major visual components of forest strips, windbreaks, snowfences, and clump plantings when detailed planning is prepared for the final alignment. These include such species as juniper (red cedar), red oak, sugar and silver maple, black walnut, shagbark hickory, choke cherry, balsam poplar, and staghorn sumac.

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TABLE 2. Forest units characterized by origin.

Urban	Agricultural	Aesthetic	Natural Units
5	1	1	[illegible]
9	2	[illegible]	14
12	3	[illegible]	[illegible]
19	4	[illegible]	[illegible]
20	6	[illegible]	[illegible]
21	7	[illegible]	[illegible]
33	11	[illegible]	[illegible]
34	13	[illegible]	31
35	15	[illegible]	33
36	16	[illegible]	[illegible]
[illegible]	17	[illegible]	42
[illegible]	22	[illegible]	[illegible]
44	24	[illegible]	[illegible]
46	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
51	[illegible]	[illegible]	[illegible]
	[illegible]		[illegible]
			[illegible]
			[illegible]
			[illegible]
			[illegible]
			72

Unit 1 - This unit, lying *near* the boundary line of the study and surrounded by industrial land use, is an agricultural remnant composed of several old apple trees and large red oaks along the old fence line. This unit occupies a slight ridge. Industrial workers are using this area during lunch breaks.

Unit 2 - This unit, occupying the slope and floodplain of a small stream system, is composed of scattered open-grown hardwoods, as sugar maple, basswood, black walnut, white ash, and white elm (largely dead). The DBH* of these trees varies from 8 to 15 inches. This site appears to have been pastured in the past. As the anticipated use surrounding this unit is industrial, the maintenance of this landscape unit would enhance visual diversity of the area.

Unit 3 - This is an abandoned orchard.

Unit 4 - This unit, [illegible] seedling and sapling-size sumac, white ash, and hard maple, is interspersed with small groups of larger hard maple, black walnut, white ash, the trees being 5 to 6 inches DBH. This unit may, at one time have been connected to Unit 2.

Unit 5 - This residential vegetation unit, *near* the study's boundary line, is composed of white ash, red and sugar maple, and several black walnuts. The trees, planted in rows, have a DBH ranging from 10 to 25 inches.

Unit 6 - This hedgerow unit is composed of mixed hardwoods and conifers - sugar maple, [illegible], and scotch pine and is in close proximity to a high tension line.

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*diameter at breast height

Unit 7 - Urban development is penetrating this unit, an active orchard area.

Unit 8 - This is a shrub community of sumac, willow, and white ash associated with a small stream system.

Unit 9 - This is a combined unit of several residential sites having relatively mature tree plantings of locust, weeping birch, norway and hard maple, and black walnut.

Unit 10 - This is a small grouping of highway plantings, a mixture of conifers of mostly low-lying shrub forms, less than 10 years old:

Unit 11 - This unit, a decadent orchard system, contains white elm and black cherry along the old fence line, while the remainder is heavily overgrown with white ash, basswood, and black cherry.

Unit 12 - This is a residential area with typical plantings, a mixture of native and exotic species. The area was an orchard prior to development as evidenced by numerous fruit trees remaining as lawn ornaments.

Unit 13 - This low-lying vegetation area associated with a drainage ditch is composed of scattered black willow, white ash, basswood, and red oak, with red osier dogwood and sumac as the dominant shrubs.

Unit 14 - An interesting remnant stand, this unit which occupies a sandy knoll does not appear to have been used recently for agriculture, but has experienced some modification with the widening of Brant Street. The species contained in this

relatively small stand are hard maple, red oak, basswood, shagbark hickory, and white ash. Despite its small area, this stand has considerable attractiveness and some ecological value.

Unit 15 - This unit is an overgrown, mature apple orchard, with saplings of white ash and black cherry.

Unit 16 - This is a fence row planting of what appears to be black locust.

Unit 17 - Also a fence line, it is composed of basswood, white ash, and hard maple, with the size ranging from 6 to 10 inches DBH.

Unit 18 - Associated with a small stream system, the dominant species in this unit are black willow, basswood, and white ash with a DBH ranging from 6 to 12 inches.

Unit 19 - Another residential unit, the vegetation is typical of mixed plantings of native and exotic species, both deciduous and coniferous. One distinct feature is the dominance of crabapple as a street edge planting and the extensive use of weeping willow as a decorative species. Much of the planting is 10 to 15 years old.

Unit 20 - Not a true vegetation unit, it is a field dominated area with scattered open grown trees, including hard maple, white elm, and basswood.

Unit 21 - This is a residential unit with hard maple and weeping willow, less than 10 years old, as the dominant planting. The development occupies old orchard lands, as demonstrated by the presence of fruit trees on the housing lots.

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Unit 22 - This narrow (20 to 30 feet) vegetation strip probably was associated with an old fence line. It is completely deciduous with hard maple, red oak, and basswood, ranging from 5 to 10 inches DBH. With management this unit could be significantly strengthened as a visual barrier between the medium density residential area and the QEW.

Unit 23 - This is a small coniferous plantation.

Unit 24 - Associated with an old farm home site, this unit is composed of red oak, white pine, and english chestnut. Extensive acreages of apple orchards are associated with this unit.

Unit 25 - One of the larger wooded areas, the dominant vegetation appears to be white ash, hard maple, and other deciduous species of secondary growth.

Unit 26 - This unit is associated with a relatively deeply incised drainage way which extends beyond the study area to where the forest becomes much more extensive. Within Unit 26, the area is composed of two narrow strips of trees along the slopes of the floodplain. The floor of the drainage way, clear of vegetation, may soon be the route of storm sewers originating from the Forestdale subdivision being developed in the area. The dominant species are mature hard maple, red oak, and white ash.

Unit 27 - This unit is a remnant of a larger woodland block. Like the previous unit, this is associated with one of the many streams originating in the plateau below the escarpment. Much of the unit has been excavated for highway construction materials. The section of the unit visible from highway 403 is a scattering of trees, red oak and hard maple, with sumac as an understory. This is a highly degraded natural system.

Unit 28 - This is a growth of shrubs, primarily willow.

Unit 29 - This is a small grouping of planted weeping willow.

Unit 30 - This is a residential area. Although Unit 30A has very little vegetation, either natural or planted, Unit 30B is located in an old plantation of spruce and red pine. Some old fence row trees, Manitoba maple and Norway spruce, have been maintained. Unit 30C is a residential area with minimal planted vegetation, all about 10 years old.

Unit 31 - This is a narrow vegetation unit associated with the slopes and floodplain of a small stream. The valley system expands quickly into a rather deep and wide valley (see Unit 33). The vegetation at the upper end is sumac, white cedar, and red osier dogwood. At the lower end of the unit , the valley has deepened and widened; the floor is open. The slopes are partially wooded with white ash, hard maple, and beech.

Unit 32 - A diverse unit, this contains a housing site with associated plantings, with a secondary growth of locust, white ash, and hard maple. A subsector is composed of large black locust and red oak along slopes and roadways.

Unit 33 - A continuation of Unit 31, this unit is composed of the floodplain and the relatively steep slopes of the stream system. The floodplain, overgrown with weeds (goldenrod and burdock) and grasses, is relatively free of vegetation except for clumps of deciduous trees as black ash and black willow. The steep slopes are covered with mature hard maple, beech, red oak, shagbark hickory, basswood, with several white pines along the banks. The bank systems are stable, although some stream erosion and Queenston sandstone exposures are evident. Some impact has occurred where the cemetery management has dumped soil over the bank. Part of the area has been landscaped to grasses, which are mowed regularly. As this unit provides a strong barrier between the highway and the residential areas, special consideration should be given to its maintenance.

Unit 34 - This is a cemetery with old plantings, which are mature hard maple, Norway spruce, and weeping birch.

Unit 35 - This residential area, 5 to 10 years old, is landscaped with Manitoba maple, weeping willow, and silver birch.

Unit 36 - This older and more expensive residential area has a mature and relatively dense system of street and lawn plantings, which are primarily species of maple.

Unit 37 - This is a planted area of weeping willow which acts as a strong visual barrier blocking the Bay and steel plants from view.

Unit 38 - A mixed residential area, 38A is old with mature street plantings of hard maple up to 30 inches DBH. A young residential area, with a scattering of older residential units, 38B has vegetation typical of the younger residential areas, that is, weeping willow, crabapple, and weeping birch.

Unit 39 - This unit is a combination of numerous farmhouse sites, with associated plantings located along the roads. Maple is the most common planting.

Unit 40 - This is a unit of windbreak systems associated with market gardens. Norway spruce was most frequently used with some lombardy poplar.

Unit 41 - The vegetation of this unit is associated with a low-land area; white elm, now dead, was the dominant form.

Unit 42 - This unit, a rapidly deteriorating hardwood stand, was dominanted by red oak, white ash, and trembling aspen, but is now overgrown with wild grape.

Unit 43 - This is a small landscaped unit of weeping willow and locust associated with the Brant General Hospital.

Unit 44 - This is a long lineal vegetation system associated with the low quality residential structures between the railway tracks and the beach area. The vegetation, of low quality, is primarily trembling aspen, lombardy poplar, and a variety of species which have been planted by the occupants of the converted cottages. Between the cottages and the water, trembling aspen is volunteering, and hard maple is the street planting material.

Unit 45 - This is a relatively small grouping of weeping willow adjacent to the Burlington Sewage Plant.

Unit 46 - This unit is a residential area of converted cottages with a sparce, low quality vegetation matrix composed of cottonwood, black willow, and scattered maple.

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Unit 47 --This low quality unit is composed of a small group of cottonwood.

Unit 48 - Volunteer vegetation on landfill, this unit is composed of small, low-level willow and Manitoba maple groups along the edge of the Bay.

Unit 49 - Of variable quality, this is a residential unit with mixed vegetation resembling that found throughout the area. Generally of low quality, the primary species are cottonwood (decadent), black willow, Manitoba maple, and hard maple.

Unit 50 - This is a small unit composed of deteriorating cottonwood.

Unit 51 - No attempt is made to detail the subsections in this large residential unit, the area south of the bridge to the south end of the beach strip. With some variation in the density of the trees, the species present an aspect of uniformity throughout the area. Particularly along Bayside Street, cottonwood consistency appears as a street and lot planting. Much of it is decadent, with a high degree of dieback and death, and a large number of cottonwood stumps evident. On the lots, the vegetation is younger, composed of a variety of species, such as locust, spruce, catalpa, Norway maple, and a number of shrub species, especially willow in significant numbers.

Unit 52 - A small unit within Unit 51, this lies on both sides of the access road at the toll plaza. The species are mature black willow and Manitoba maple.

Unit 53 - This unit is composed of shrubs and second growth on land fill on the Bay side of the beach area.

Unit 54 - This is an area of open grown trembling aspen, with mowed grass between the trees.

Unit 55 - This is a small grouping of weeping willow.

Unit 56 - This unit has a number of sections located along the beach area. Much of the vegetation has been planted including grassed areas and parking lots. The main species are cottonwood, oak, lombardy poplar, white ash, hard maple, Manitoba maple, and weeping willow.

Unit 57 - This is a highly manicured park unit with large trees along the stream. Large red oaks are a significant component.

Unit 58 - This unit is a paddock area for buffalo, which have grazed it heavily. The vegetation is white ash.

Unit 59 - This unit in the park area is a grassed orchard with a new conifer plantation.

Unit 60 - Sumac, red osier dogwood, and cattail cover this low area.

Unit 61 - This is an abandoned pasture.

Unit 62 - This is single row planting of weeping willow.

Unit 63 - A small residential area adjacent to Lang's Food, the vegetation around the houses is weeping willow, shagbark hickory, Manitoba maple, and several large red oak with conifers and catalpa.

Unit 64 - A park unit, it is a mowed grassed area with scattered trees of various species.

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Unit 65 - This unit is an abandoned apple orchard.

Unit 66 - Of low quality, this is a small secondary growth area with a few large trees - red oak, shagbark hickory, and white ash, ranging from 15 to 20 inches DBH. Most of the site, associated with a lowland stream area, is composed of much younger material, white ash, hawthorn, and hard maple being the dominant sapling species. Sumac and red osier dogwood are also present.

Unit 67 - This unit is part of a large stand (see Units 68 and 69), but is distinct from the other units. Unlike Units 68 and 69, this one is a mature hardwood stand having some inherent quality, but deteriorating. This stand is relatively diverse: hard maple, beech, red oak, shagbark hickory, hop hornbeam, white elm, white cedar, and white pine. Many of the canopy trees exceed 20 inches DBH, several of the red oaks exceed 30 inches DBH. The stand also has numerous indications of impact condition: invading hawthorn and large tooth aspen, numerous felled trees, and vandalizing by children wielding hatchets. Some parts of the unit are rather scrubby in appearance.

Unit 68 - This is an open lowland area separating units 67 and 69. Without trees, the ground cover is dense.

Unit 69 - This is an area of young growth of hard maple and white ash; few trees exceed 5 inches DBH. White elm, now dead, occupied it in part.

Unit 70 - This unit has several large scattered trees, mainly oak and hard maple, and a dense undergrowth. The undergrowth is hard maple and white ash with sumac and red osier dogwood at the fringes.

Unit 71 - This unit of low quality is associated with the lowland along the creek. Most of the vegetation is sapling and seedling growth with only a few trees. The species are sumac, willow, and white ash.

Unit 72 - This unit is composed of two remnant deciduous areas. The original stand edged the banks of the creek, but much of the stand has been decimated by the solid waste disposal site, which is visually dominant. The remaining areas are small narrow strips of hard maple and ash, which are threatened by increased waste disposal.

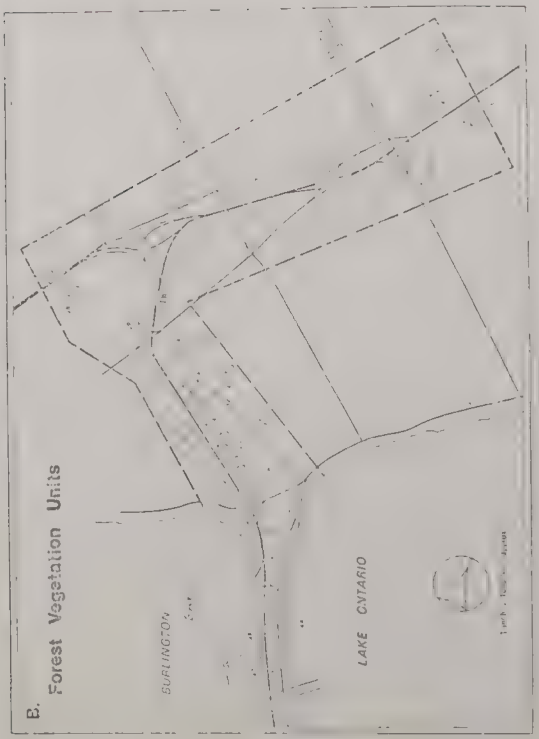

FIGURE 2

B. Forest Vegetation Units

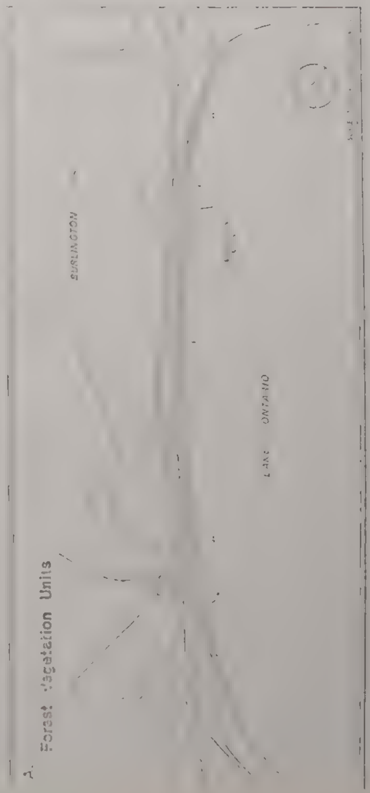

FIGURE 2

A. Forest Vegetation Units

```
ONTARIO WATER RESOURCES COMMISSION  WATER QUALITY MONITORING PROGRAM   JAN 01, 1971  TO  DEC 31, 1971     PAGE [illegible]
[illegible]
[illegible]                                SAMPLE POINT [illegible]

                                WATER      5-DAY  TOT SUSP  TURB COND  TOT   SOL   NH-3  TOT   NO-2  NO-3 CHLO HARD  ALK  TOT   PH
                         FLOW   TEMP  DO   BOD    SOL  SOL  IDITY 25C.  P     P    AS N  KJEL  AS N  AS N RIDE NESS CACO3 IRON AT
                         CFS     C.  PPM   PPM    PPM  PPM  UNITS UMHO AS P  AS P  PPM   PPM   PPM   PPM  PPM  PPM  PPM   PPM  LAB
[illegible] 1 71 1430   2300.   0.0 10.0   2.0  340   10  12.0  759 0.12  0.06  0.11  0.90  0.01  1.10  43
[illegible]             [illegible]  0.0 10.5   1.8  550   10   8.0  606 0.14  0.07  0.26  1.20  0.02  2.10  59
[illegible]             [illegible]  0.0  9.0   3.5 1020   60  50.0 1575 0.05        0.37  0.75  0.01  0.54 450  120   66  7.60  8.0
[illegible]             [illegible]  0.0 10.0   1.4  580   80  30.0  744 0.13  0.06  0.13  1.00  0.02  1.20  37  318  214  2.00  9.3
[illegible]             [illegible]  6.0  9.5   0.8  340   15  15.0  480 0.05  0.02  0.05  0.58  0.01  1.20  24
[illegible]             [illegible]  [illegible]  2.0  480  0  [illegible]  0.14  1.10  [illegible]  11
[illegible]             [illegible]  [illegible]  10  [illegible]
[illegible]             [illegible] 12.5  7.0   7.0  440   20  40.0  639 0.20  0.00  0.46  2.00  0.05  [illegible]
[illegible]             [illegible] 13.5  5.5   6.0  540   60  33.0  684 0.23  0.01  0.08  1.60  0.05  3.94  51  310  228  1.60  8.3
1[illegible] 6 71 1445  5800.  18.4  7.0   6.0  400  100 100.0  522 0.70              2.50              35  240  170  7.20  [illegible]
[illegible]             [illegible]  [illegible]  4.0   1.0  410  [illegible]  11.0  [illegible]  0.29  0.03  [illegible]  0.01  1.60  31  [illegible]
13 7 71 1425  15000.    22.0  6.0  11.0  630   50  20.0  788 0.25  0.00  0.01  1.90  0.05  1.30  65
21 7 71 1405    504.    14.0  7.0   4.0  500   10   8.0  690 0.22  0.07  0.34  1.50  0.12  1.00  72  263  177  0.70  8.2
27 7 71 1430   2400.    20.0  6.5   7.0  530   60  80.0  620 0.40  0.10  0.75  2.40  0.07  0.41  61
10 8 71 1425     64.    24.0  6.6  11.0  560  100  40.0  649 0.85  0.29  1.50  6.00  0.00        64
24 8 71 1440  31000.    15.0  7.0   3.5  590   90  20.0  609 0.46  0.12  0.15  1.50  0.09  1.10  68
 7 9 71 1400   2050.    25.0  6.0   9.5  510   90  50.0  630 0.26  0.01  0.10  2.00  0.06  0.53  64
 5 10 71 1405   720.    14.0  8.5   5.0  470   10  12.0  638 0.19  0.01  0.21  1.60  0.07  0.68  62
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ONTARIO WATER RESOURCES COMMISSION    WATER QUALITY MONITORING PROGRAM    JAN 01, 1971   TO [illegible]
[illegible]                         STREAM MILEAGE- G     0.3
STREAM- GRINDSTONE CR.              SAMPLE POINT [illegible] HIGHWAY [illegible]

 DATE               COLI            WATER      5-DAY  TOT SUSP  TURB COND  TOT   SOL   NH-3  TOT   NO-2  NO-3 CHLO HARD  ALK  TOT   PH
 SAMPLED  HOUR     FORMS    FLOW    TEMP  DO   BOD    SOL  SOL  IDITY 25C.  P     P    AS N  KJEL  AS N  AS N RIDE NESS CACO3 IRON AT
 D  M  Y           /100ML   CFS      C.  PPM   PPM    PPM  PPM  UNITS UMHO AS P  AS P  PPM   PPM   PPM   PPM  PPM  PPM  PPM   PPM  LAB
[illegible] 71 1410  112.           13.5 10.0   6.0  560   10   4.0  746 0.16  0.01  0.01  1.50  0.03  0.43  [illegible]
[illegible] 11 71 1405  320.         9.5  9.0   5.0  590   15  15.0  638 0.18  0.01  0.12  1.30  0.04  0.62  92
16 11 71 1410  2500.                 9.0  9.0   1.6  560   40  30.0  758 0.28  0.16  0.09  0.70  0.02  1.70  66
[illegible] 12 71 1535  4100.        1.0 10.0

NO.SAMPLES          22              22   22    21   21   21    21   21   21    19    14    21    20    19   21    6    6    6     6
MAXIMUM         31000.            25.0 11.0  11.0 1020  100 100.0 1575 0.85  0.29  1.50  6.00  0.12  2.10 450  319  228  7.[illegible]  9.[illegible]
MINIMUM             8.             0.0  5.5   0.8  340    5   4.0  490 0.05  0.00  0.01  0.58  0.00  0.41  24  170   66  0.70  7.3
AVERAGE          3786.            12.3  8.2   4.8  534   41  33.5  711 0.26  0.05  0.26  1.64  0.04  1.03  75  243  130  2.32  8.3
MEDIAN           1200.
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APP[illegible] 2

[illegible] WATER QUALITY [illegible] PROGRAM JAN 01, 1971 TO [illegible] 1971

DATE D M Y [illegible]	COLI /100ML	FLOW CFS	WATER TEMP C.	DO PPM	5-DAY BOD PPM	TOT SOL PPM	SUSP SOL PPM	TURB IDITY UNITS	COND 25C. UMHO	TOT P AS P	SOL P AS P	NH-3 AS N PPM	TOT KJEL PPM	NO-2 AS N PPM	NO-3 AS N PPM	CL [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		0.5	[illegible]	15.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.[illegible]	0.1[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.[illegible]
[illegible]	2100000.		2.0	5.0	36.0	600	35	30.0	978	1.70	0.22	1.70	11.00	0.00	0.01	145				
[illegible] 71 [illegible]	[illegible]70000.		3.5	9.0	24.0	1220	670		935	2.10	0.00	2.10	7.40	0.15	1.50	184				
[illegible]	140000.		1.0	10.0	8.5	560	25	12.0	743	0.18	0.11	1.20	1.60	0.03	1.40	86				
[illegible] 3 [illegible]	161000.		6.0	9.0	14.0	610	40	40.0	927	0.72	0.23	2.20	4.50	0.05	1.20	12[illegible]				
[illegible]	1[illegible]0000.		7.0	9.0	17.0	600	25	35.0	690	1.00	0.21	4.60	7.40	0.10	1.20	112				
[illegible]	1[illegible]0000.		14.0	5.0	46.0	630	30	6.0	8[illegible]	1.80	1.10	7.30	9.30	0.01		116				
[illegible]	4300.		12.0	5.0	42.0	540	25	20.0	805	1.90	0.60	8.60	11.00	0.15	0.30	114	252	160	1.90	7.5
[illegible]	1020000.		18.0	4.0	50.0	440	30	3[illegible].0	[illegible]	2.[illegible]0	1.5[illegible]	8.40	14.0[illegible]	0.[illegible]		5[illegible]	2[illegible]2	[illegible]54	1.[illegible]	7.4
[illegible] 6 71 [illegible]	[illegible]		16.0	5.0	50.0	600	35	49.0	[illegible]	2.20	0.[illegible]	7.60	1[illegible].00	0.11	[illegible]	[illegible]				
[illegible]	208.		18.0	4.0	32.0	560	35	50.0	792	2.40	0.90	7.20	11.00	0.33	0.21	51				
[illegible] 6 71 [illegible]	28.		23.0	4.0	43.0	550	45	35.0	730	0.27	0.80	6.60	8.50	0.15	0.43	98				
[illegible] 7 71 134[illegible]	770.		23.5	4.0	17.0	530	50	40.0	735	1.70	0.50	5.20	10.00	0.12	0.30	104				
27 7 71 1[illegible]	1.		18.0	4.0	42.0	500	25	40.0	734	1.90	0.20	6.50	16.00	0.15	0.49	98				
[illegible] 71 [illegible]	48.		23.0	4.0	11.0	520	70	12.0	702	1.50	1.20	7.60	14.00	0.32	0.38	92	210	134	1.75	7.3
[illegible] 8 71 134[illegible]	160.		19.5	5.0	34.0	520	45	70.0	746	1.80	0.48	2.50	11.00	0.20	0.78	110	256	126	2.60	7.4
7 9 71 1343	1040000.		22.5	5.0	30.0	450	30	40.0	687	1.00	0.25	4.90	7.00	0.20	0.16	67				
21 9 71 1345	8.		22.5	2.0	14.0	400	25	10.0	721	2.50	0.55	6.50	14.00	0.15	0.32	91				

APPENDIX 2 CON'T

ONTARIO WATER RESOURCES COMMISSION _ WATER QUALITY MONITORING PROGRAM JAN 01, 1971 TO [illegible]

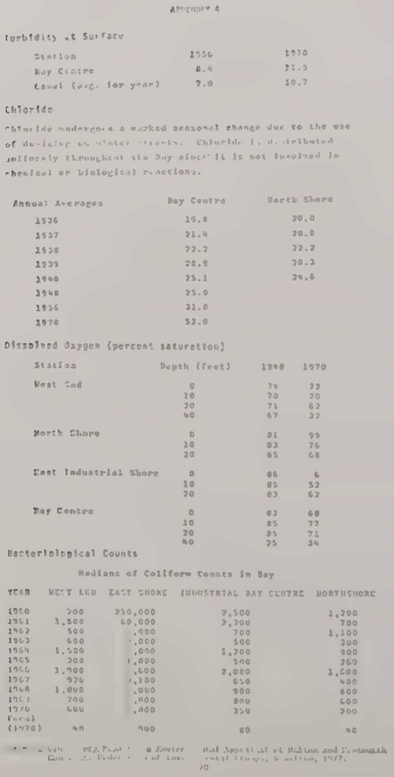
DATE D M Y	COLI /100ML	FLOW CFS	WATER TEMP C.	DO PPM	5-DAY BOD PPM	TOT SOL PPM	SUSP SOL PPM	TURB IDITY UNITS	COND 25C. UMHO	TOT P AS P	SOL P AS P	NH-3 AS N PPM	TOT KJEL PPM	NO-2 AS N PPM	NO-3 AS N PPM	CL PPM	[illegible]	[illegible]	[illegible]	[illegible]
5 10 71 1350	700.		22.5	4.0	79.0	460	70	40.0	8[illegible]4	2.00	0.35	6.00	13.00	0.01	[illegible]	[illegible]				
19 10 71 1342	*********		20.0	3.0	44.0	470	50	50.0	704	3.10	1.30	9.00	15.00	0.10	0.22	87				
2 11 71 1450	98000000.		20.0	4.0	48.0	480	45	40.0	720	1.50	0.00	7.00	11.00	0.00	0.01	97	[illegible]	144	[illegible].50	7.3
16 11 71 1445	44000000.		17.0	2.0	47.0	570	50	40.0	701	1.00	0.23	12.00	10.00	0.01	0.01	95	1[illegible]6	146	[illegible].40	7.4
23 11 71 1446	10000000.		12.0	6.0	38.0	740	20	50.0	1174	1.50	0.01	9.20	10.00	0.00	0.22	[illegible]				
14 12 71 1450	17300000.		14.0	5.0	90.0	600	60	40.0	914	7.50	2.00	8.00	23.00	0.05	[illegible]	[illegible]	[illegible]	165	3.[illegible]0	7.1
[illegible]0 12 71 1645	588.		12.0	7.0	44.0	620	40	[illegible].0	966	0.[illegible]	0.29	9.00	11.00	0.[illegible]3	[illegible]	[illegible]				
NUMBER [illegible]S	25		25	25	25	25	25	[illegible]	25	[illegible]	25	25	25	25	2[illegible]	25	8	8	8	8
MAXIMUM	*********		23.5	10.0	90.0	1220	670	70.0	1174	7.50	2.00	12.00	23.00	0.33	1.[illegible]0	316	292	160	3.[illegible]0	8.[illegible]
MINIMUM	1.		1.0	2.0	3.5	440	20	6.0	654	0.18	0.00	1.20	1.60	0.00	0.01	86	196	126	1.40	7.3
AVERAGE	10963713.		15.0	5.3	30.9	576	65	34.8	818	1.40	0.60	6.11	11.00	0.11	[illegible]	111	[illegible]	140	[illegible]	[illegible]
MEDIAN	181000.																			

APPENDIX F — 1972 Environmental Inventory

APPENDIX 3

DATE SAMPLED D M Y	HOUR	COLI FORMS /100ML	FLOW CFS	WATER TEMP C.	DO PPM	5-DAY BOD PPM	TOT SOL PPM	SUSP SOL PPM	TURB IDITY UNITS	COND 25C. UMHO	TOT P AS P	SOL P AS P	NH-3 AS N PPM	TOT KJEL PPM	NO-2 AS N PPM	NO-3 AS N PPM	CHLO RIDE PPM	HARD NESS PPM	ALK CACO3 PPM	TOT IRON PPM	PH AT LAB
12 1 71	1435	1200.		0.0	8.0	1.8	440	10	4.0	626	0.09	0.01	0.05	0.70	0.01	1.00	26	324	246	0.05	8.0
29 2 71	1735	18000.		0.5	12.0	4.0	540	100	25.0	736	0.18	0.03	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
21 3 71	1510	304.		1.0	11.0	1.0	330	10	12.0	500	0.07	0.02	0.04	0.82	0.01	1.30	21				
6 4 71	1105	485.		2.0	12.0	1.0	430	10	30.0	612	0.03	0.01	0.08	0.82	0.01	1.70	38				
20 4 71	1735	540.		13.0	10.0	1.6	370	10	6.0	471	0.05	0.01	0.07	0.92	0.01	0.42	39				
4 5 71	1500	198.		8.0	9.0	1.4	300	5	2.0	525	0.03	0.00	0.03	0.81	0.01	0.75	23	279	215	0.20	5.9
17 5 71	1330	5700.		16.0	5.0	3.0	300	40	30.0	628	0.10	0.30	0.20	1.30	0.01	0.67	46	306	216	1.70	8.1
1 6 71	1520	1300.		16.0	10.0	1.8	400	40	15.0	600	0.08	0.00	0.07	1.00	0.02	0.65	41				
15 6 71	1135	4000.		18.0	8.0	1.4	340	10	12.0	564	0.09	0.01	[illegible]	[illegible]	[illegible]	[illegible]					
29 6 71	1430	11000.		23.0	6.0	3.0	500	45	35.0	548	0.09	0.01	0.06	0.74	0.01	0.52	25				
13 7 71	1420	14400.		21.0	6.0	3.0	400	10	15.0	602	0.06	0.00	0.03	0.66	0.00	0.26	44				
27 7 71	1425	59000.		20.0	7.0	2.5	460	35	35.0	578	0.12	0.01	0.11	0.65	0.01	0.65	38				
10 8 71	1420	4100.		24.5	6.0	3.5	450	10	3.0	619	0.00	0.00	0.01	0.09	0.00	0.19	45	289	174	0.20	7.9
3 71	1420	18000.		15.5	8.0	1.4	500	10	50.0	635	0.12	0.30	0.06	0.90	0.01	0.65	52	289	202	2.70	8.1
7 9 71	1425	900.		23.0	6.0	1.6	510	10	15.0	666	0.04	0.00	0.07	0.58	0.01	0.42	40				
21 9 71	1425	29000.		15.5	8.0	1.2	470	30	6.0	597	0.10	0.01	0.08	0.90	0.01	0.69	40				

DATE SAMPLED D M Y	HOUR	COLI FORMS /100ML	FLOW CFS	WATER TEMP C.	DO PPM	5-DAY BOD PPM	TOT SOL PPM	SUSP SOL PPM	TURB IDITY UNITS	CONT 25C. UMHO	TOT P AS P	SOL P AS P	NH-3 AS N PPM	TOT KJEL PPM	NO-2 AS N PPM	NO-3 AS N PPM	CHLO RIDE PPM	HARD NESS PPM	ALK CACO3 PPM	TOT IRON PPM	PH AT LAB
5 10 71	1425	4000.		17.0	4.0	1.2	480	10	15.0	604	0.07	0.00	0.06	0.52	0.07	0.40					
19 10 71	1425	2900.		13.5	8.0	1.2	440	5	2.0	631	0.03	0.00	0.03	0.56	0.01	0.45	35				
2 11 71	1525	4500.		14.0	9.0	1.8	460	10	8.0	696	0.04	0.00	0.07	0.96	0.00	0.50	42	256	237	0.00	8.1
16 11 71	1522	15000.		9.5	10.0	1.4	520	10	6.0	643	0.02	0.00	0.06	0.49	0.01	0.93	42	332	240	0.44	
30 11 71	1525	2600.		1.5	9.0	2.0	410	5	6.0	618	0.03	0.00	0.08	[illegible]	[illegible]	[illegible]	[illegible]				
14 12 71	1530	384.		0.5	9.0	1.2	390	15	6.0	570	0.04	0.01	0.05	0.82	0.01	0.71	24	306	185	0.50	8.1
28 12 71	1530	3300.		1.0	11.0	4.5	460	10	6.0	620	0.06	0.01	0.09	0.72	0.01	0.73	[illegible]				
NO. SAMPLES		25		25	25	25	25	25	25	25	25	25	25	25	25	25	24	8	8	9	7
MAXIMUM		69000.		24.5	13.0	9.0	1010	500	200.0	752	1.70	0.03	0.25	6.00	0.05	1.70	93	332	249	2.70	8.1
MINIMUM		180.		0.0	4.0	1.0	300	5	2.0	471	0.00	0.00	0.01	0.08	0.00	0.10	16	236	174	0.00	[illegible]
AVERAGE		11635.		11.0	8.6	2.3	453	38	22.7	667	0.13	0.01	0.07	0.92	0.01	0.68	39	295	215	0.67	8.2
[illegible]		[illegible]																			



APPENDIX A

Turbidity at Surface

Station	1956	1970
Bay Centre	8.4	21.5
Canal (avg. for year)	7.0	10.7

Chloride

Chloride undergoes a marked seasonal change due to the use of de-icing on winter streets. Chloride is distributed uniformly throughout the Bay since it is not involved in chemical or biological reactions.

Annual Averages	Bay Centre	North Shore
1936	19.8	20.0
1937	21.4	20.8
1938	22.3	22.2
1939	20.9	20.3
1940	25.1	24.6
1948	25.0	
1956	31.8	
1970	53.0	

Dissolved Oxygen (percent saturation)

Station	Depth (feet)	1948	1970
West End	0	74	72
	10	70	70
	20	71	62
	40	67	32
North Shore	0	81	99
	10	83	76
	20	85	68
East Industrial Shore	0	86	6
	10	85	52
	20	83	62
Bay Centre	0	83	68
	10	85	77
	20	85	71
	40	25	34

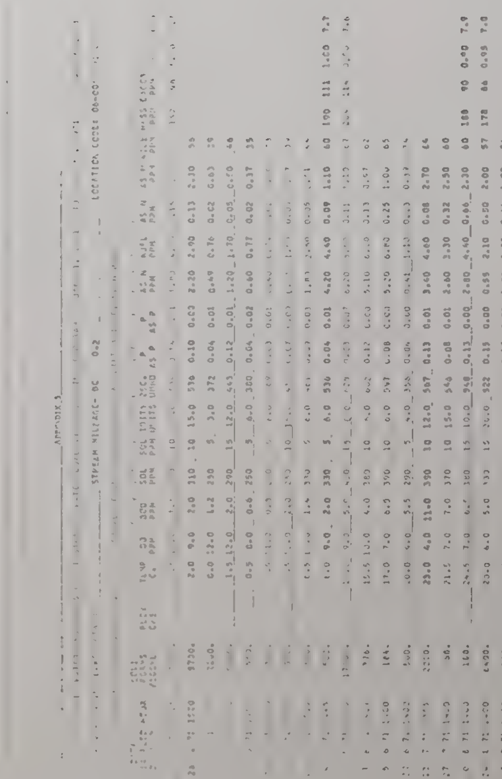
Bacteriological Counts

Medians of Coliform Counts in Bay

YEAR	WEST END	EAST SHORE INDUSTRIAL	BAY CENTRE	NORTHSHORE
1960	700	250,000	2,500	1,200
1961	1,500	60,000	3,300	700
1962	500	,000	700	1,100
1963	600	,000	500	300
1964	1,500	,000	1,200	900
1965	300	,000	500	260
1966	1,900	,600	2,000	1,600
1967	920	,100	650	400
1968	1,000	,000	900	800
1969	700	,800	800	600
1970	600	,000	350	700
Fecal (1970)	40	900	80	40

[illegible] Hall Appraisal of Hamilton and Wentworth [illegible] Environmental Groups, Hamilton, 1972.

70



APPENDIX 5 CONT'D

ONTARIO WATER RESOURCES COMMISSION WATER QUALITY MONITORING PROGRAM JAN 01, 1971 TO [illegible]

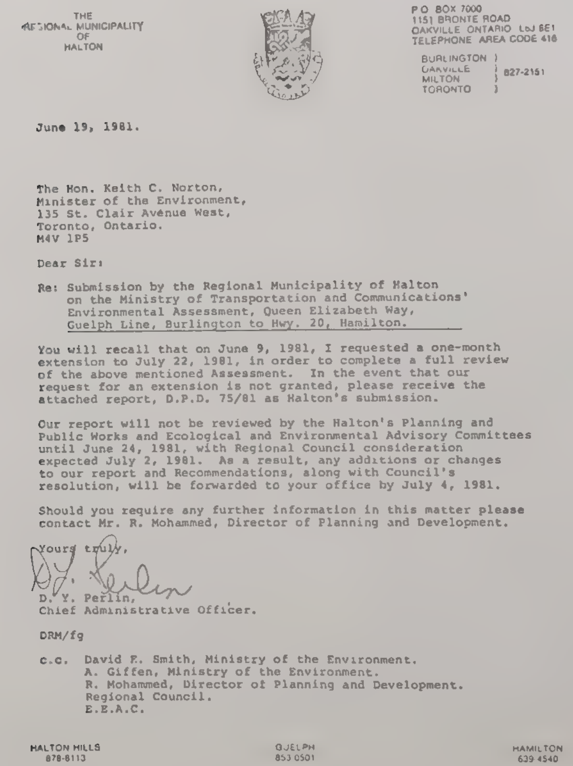
DATE SAMPLED D M Y	HOUR	COLI FORMS /100ML	FLOW CFS	WATER TEMP C.	DO PPM	5-DAY BOD PPM	TOT SOL PPM	SUSP SOL PPM	TURBIDITY UNITS	COND 25C. UMHO	TOT P AS P	SOL P AS P	NH3 AS N PPM	TOT KJEL PPM	NO2 AS N PPM	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] 9 71	1400	216.		19.0	8.0	3.8	230	5	3.0	361	0.05	0.02	0.02	1.30	0.1	[illegible]	[illegible]				
5 10 71	1435	5200.		15.5	7.0	7.0	290	5	4.0	415	0.07	0.01	2.00	3.00	0.25	[illegible]	[illegible]				
19 10 71	1400	3700.		13.0	2.0	5.0	330	5	3.0	474	0.07	0.01	[illegible]	[illegible]	[illegible]	[illegible]					
2 11 71	1503	12600.		16.0	4.0	6.0	330	10	3.0	462	0.08	0.00	0.69	1.50	0.33	2.60	50	166	78	0.6[illegible]	[illegible]
16 11 71	1330	8400.		11.0	6.0	1.6	330	5	3.0	459	0.05	0.00	0.59	1.20	0.31	2.10	50	168	77	0.5[illegible]	7.6
[illegible] 11 71	1500	11000.		0.5	9.0	4.0	290	10	10.0	420	0.07	0.00	0.61	1.10	0.12	1.90	45				
[illegible] 12 71	1305	15000.		4.0	10.0	1.4	220	15	3.0	360	0.05	0.01	0.10	0.52	0.01	0.35	31	144	96	0.65	7.7
[illegible] 12 71	1305	18330.		4.0	10.0	3.5	260	10	3.0	432	0.05	0.01	0.05	1.30	0.03	1.00	41				
NO.SAMPLES		26		26	26	26	26	26	26	26	26	26	26	26	26	26	26	8	8	8	8
MAXIMUM		[illegible]		24.5	12.0	11.0	430	15	20.0	628	0.23	0.07	6.20	8.50	0.66	7.10	67	204	114	1.70	7.9
MINIMUM		[illegible]		[illegible]	2.0	0.6	200	5	3.0	356	0.03	0.00	0.10	0.52	0.01	0.35	31	144	77	0.45	7.0
AVERAGE		[illegible]		11.4	8.3	3.9	311	9	8.2	474	0.09	0.01	1.87	2.76	0.19	2.42	49	178	93	0.87	7.6
MEDIAN		[illegible]																			

APPENDIX G – Taxonomical Nomenclature

American coot	Fulica americana
Black-crowned night heron	Nycticorax nycticorax
Black tern	Chlidonias niger
Blue Winged teal	Anas discors
Bonaparte's Gull	Larus philadelphia
Common gallinule	Gallinule chloropus
Common tern	Sterna hirunda
Florida Gallinule	Gallinula chloropus cachinnans
Gadwall	Anas strepera
Grackle	Quiscalus quiscula
Green Heron	Butorides virescens virescens
Green-winged teal	Anas carolinensis
Herring gull	Larus argentatus
Killdeer	Charadrius vociferus vociferus
Least bittern	Ixobrychus exilis
Long-billed marsh wren	Telmatodytes palustris
Mallard	Anas platyrhynchos platyrhynchos
Meadowlark	Sturnella magna
Pheasant	Phasianus colchicus torquatus
Pied billed grebe	Podilymbus podiceps
Red Wing blackbird	Agelaius phoeniceus
Robin	Turdus migratorius
Starling	Sturnus vulgaris vulgaris
Tree Swallow	Iridoprocne bicolor
Blanding's turtle	Emydoidea blandingi
Eastern spiny softshell	Trionyx spiniferus spiniferus
Map turtle	Graptemys geographica
Musk turtle	Sternothenus odoratus
Painted turtle	Chrysemys picta marginata
Snapping turtle	Chelydra serpentina serpentina
Red bat	Lasiurus borealis borealis
Cat-tail	Typha latifolia

APPENDIX H – Municipal Comments

REGIONAL MUNICIPALITY OF HALTON



THE
REGIONAL MUNICIPALITY
OF
HALTON

P O BOX 7000
1151 BRONTE ROAD
OAKVILLE ONTARIO L6J 6E1
TELEPHONE AREA CODE 416

BURLINGTON)
OAKVILLE) 827-2151
MILTON)
TORONTO)

June 19, 1981.

The Hon. Keith C. Norton,
Minister of the Environment,
135 St. Clair Avenue West,
Toronto, Ontario.
M4V 1P5

Dear Sir:

Re: Submission by the Regional Municipality of Halton on the Ministry of Transportation and Communications' Environmental Assessment, Queen Elizabeth Way, Guelph Line, Burlington to Hwy. 20, Hamilton.

You will recall that on June 9, 1981, I requested a one-month extension to July 22, 1981, in order to complete a full review of the above mentioned Assessment. In the event that our request for an extension is not granted, please receive the attached report, D.P.D. 75/81 as Halton's submission.

Our report will not be reviewed by the Halton's Planning and Public Works and Ecological and Environmental Advisory Committees until June 24, 1981, with Regional Council consideration expected July 2, 1981. As a result, any additions or changes to our report and Recommendations, along with Council's resolution, will be forwarded to your office by July 4, 1981.

Should you require any further information in this matter please contact Mr. R. Mohammed, Director of Planning and Development.

Yours truly,

D.Y. Perlin

D. Y. Perlin,
Chief Administrative Officer.

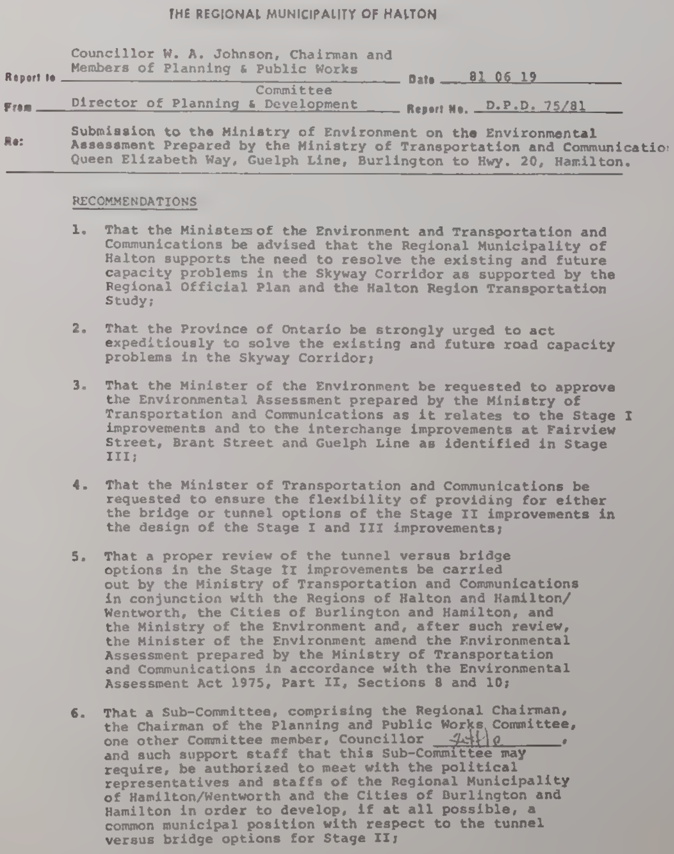
DRM/fg

c.c. David F. Smith, Ministry of the Environment.
A. Giffen, Ministry of the Environment.
R. Mohammed, Director of Planning and Development.
Regional Council.
E.E.A.C.

HALTON HILLS
878-8113

GUELPH
853 0501

HAMILTON
639 4540



THE REGIONAL MUNICIPALITY OF HALTON

Report to Councillor W. A. Johnson, Chairman and Members of Planning & Public Works Committee
Date 81 06 19
From Director of Planning & Development
Report No. D.P.D. 75/81
Re: Submission to the Ministry of Environment on the Environmental Assessment Prepared by the Ministry of Transportation and Communicatio Queen Elizabeth Way, Guelph Line, Burlington to Hwy. 20, Hamilton.

RECOMMENDATIONS

1. That the Ministers of the Environment and Transportation and Communications be advised that the Regional Municipality of Halton supports the need to resolve the existing and future capacity problems in the Skyway Corridor as supported by the Regional Official Plan and the Halton Region Transportation Study;

2. That the Province of Ontario be strongly urged to act expeditiously to solve the existing and future road capacity problems in the Skyway Corridor;

3. That the Minister of the Environment be requested to approve the Environmental Assessment prepared by the Ministry of Transportation and Communications as it relates to the Stage I improvements and to the interchange improvements at Fairview Street, Brant Street and Guelph Line as identified in Stage III;

4. That the Minister of Transportation and Communications be requested to ensure the flexibility of providing for either the bridge or tunnel options of the Stage II improvements in the design of the Stage I and III improvements;

5. That a proper review of the tunnel versus bridge options in the Stage II improvements be carried out by the Ministry of Transportation and Communications in conjunction with the Regions of Halton and Hamilton/Wentworth, the Cities of Burlington and Hamilton, and the Ministry of the Environment and, after such review, the Minister of the Environment amend the Environmental Assessment prepared by the Ministry of Transportation and Communications in accordance with the Environmental Assessment Act 1975, Part II, Sections 8 and 10;

6. That a Sub-Committee, comprising the Regional Chairman, the Chairman of the Planning and Public Works Committee, one other Committee member, Councillor [illegible], and such support staff that this Sub-Committee may require, be authorized to meet with the political representatives and staffs of the Regional Municipality of Hamilton/Wentworth and the Cities of Burlington and Hamilton in order to develop, if at all possible, a common municipal position with respect to the tunnel versus bridge options for Stage II;

7. That the Minister of Transportation and Communications be requested to give careful consideration to not proceeding with the construction of Highway 403 across Halton until such time as there is a final decision on the Stage II options to the Skyway corridor;

8. That D.P.D. Report No. 75/81 be forwarded to the Minister of the Environment as Halton Region's submission on the Environmental Assessment, Queen Elizabeth Way, Burlington to Hamilton, prepared by the Ministry of Transportation and Communications.

REPORT

The Ministry of Transportation and Communications has since the early 1970's been aware of the existing and potential operational and capacity problems in the Skyway Corridor. Between 1972 and 1979 the M.T.C. carried out two major studies intended to address the problems in this corridor. Based on these studies, the M.T.C. prepared an Environmental Assessment for the Queen Elizabeth Way, Burlington to Hamilton.

A Technical Appendix, attached to this report, provides a general description of the undertaking, background information, and a summary of the staged improvements. Staff will provide, by way of graphic panels, a brief description of the project at the Planning and Public Works Committee meeting.

This Assessment is required by the Environmental Assessment Act, 1975 and must be submitted to the Ministry of the Environment for a review. The Region of Halton has been notified by the Ministry of the Environment that a review of the M.T.C. Environmental Assessment has been completed with the request for submissions or a hearing under the Act to be received no later than 81 06 22.

The Ministry of Environment's Review contains the following recommendation:

> "The Environmental Assessment sets out an adequate rationale for increasing the capacity of the Queen Elizabeth Way between Guelph Line and Highway 20 by the implementation of Stage I improvements, and together with the type of design and construction report mentioned in the review, forms a sufficient basis for proceeding with construction of Stage I improvements. Conditional approval of Stage I should therefore be given. The rationale for the size, nature and timing of improvements beyond Stage I should deal with the issues set out in this review, as they pertain to Stages II and III. The decision on the twinning of the Skyway or other capacity improvements beyond Stage I should only be taken after M.T.C. has addressed the above issues in a further Environmental Assessment."

Region of Halton Submission

For the purpose of this submission, this Region's response to the Environmental Assessment by the Ministry of Transportation and Communications and the review by the Ministry of the Environment, has been divided into the following subject areas.

- Traffic Forecasts/Capacity.
- Transit.
- Energy.
- Economic Development.
- Environment.
- Analysis of Options.
- Conclusions.

Traffic Forecasts

The M.T.C. has clearly documented the traffic forecasts for this corridor, to the Year 2001, from the Toronto Area and Region Model Study (T.A.R.M.S.). In addition, the Halton Region Transportation Study (H.R.T.S.) was also referenced by the M.T.C., in support of the forecast.

Based on Halton's own transportation study and participation in the 1978/79 M.T.C. Skyway Study Technical Advisory Committee, Staff agrees that there are current capacity problems and that these will increase with the projected traffic growth. The Ministry of the Environment suggests that the traffic forecasts are based on historical trends and that these trends may not prevail into the future. This concern is indeed valid, and the M.T.C. Assessment did not address this issue properly. However, the H.R.T.S. study considered three scenarios in an attempt to account for these future changes in travel behaviour:

Scenario A...low transit usage (existing level).

Scenario B...high transit usage (double of today's transit modal splits).

Scenario C...high transit usage with changed travel behaviour (20% reduction in external travel and a 10% increase in internal travel).

APPENDIX H - Municipal Comments

The Halton study adopted Scenario C for planning purposes, in an attempt to reflect changing travel habits due to increased energy costs and as a reflection of increased Regional self containment, achieved through a balanced level of population and job opportunities, identified by the Region's Official Plan.

Depending on the level of growth anticipated for Halton Region under Scenario C, a 3 to 4 lane capacity deficiency has been identified in the Skyway Corridor, by 2001. In conclusion the Halton Region Study in considering changing travel habits, supports the M.T.C. forecasts for this corridor.

Because of the anticipated traffic growth in this corridor, remedial operational measures such as improvements to lateral clearance, lane width and lane configuration, as suggested by the Ministry of Environment's review, would provide a negligable increase in capacity. In addition, many of these improvements may not prove practical from an engineering point of view.

The Stage I improvements will provide two benefits of a short term nature. Firstly, it will improve the existing level of service problems in the corridor and accommodate the additional traffic growth anticipated from the development of the Maple Community in Burlington. It must be remembered that construction of the Stage II improvements could take up to five years, if the necessary approvals were immediately available. With traffic growth anticipated at 1 to 3 per cent per year, the Stage I improvements, though beneficial and warranted, can be considered of an interim nature as indicated by the Halton Region Transportation Study. Secondly, the Stage I improvements will provide an improved "safety valve" for the corridor during inclement weather or emergency conditions. Operations of the lift bridge will still limit the effectiveness of the Stage I improvements.

Transit

The Ministry of Environment's review suggests that the transit alternatives considered as a means to accommodate long term traffic growth in this corridor have been discounted. It has been indicated that the Region of Halton adopted Scenario C for transportation planning purposes. Under this Scenario, modal splits ranging from 12 to 25 per cent were considered. This would amount to a maximum of 1200 p.m. peak hour peak direction transit trips, which would justify exclusive bus lanes, at best. This would amount to half a lane saving which would be required in any event to provide this exclusive bus lane. A modal split of 25 per cent is a 400 per cent increase in transit useage over today's condition in this corridor.

When considering transit in this Corridor, the successful diversion of person trips to transit from the automobile is dependent on the makeup or composition of the traffic. It is pointed out that 60 per cent of the peak hour week day traffic consists of commuters. The Halton Region Transportation Study agrees with this finding; however, on an all day basis or over 24 hours, 50 per cent of the traffic in this corridor has neither origin or destination in Halton or Hamilton-Wentworth Regions. For transit beyond conventional forms to be viable, the demands must be present for more than just the peak hour. In addition the commuter traffic that is related to the Skyway Corridor consists of many people involved in the steel industries which require shift work. Again, the shift worker is very hard to accommodate on most transit systems due to the difference between the hours of transit operation and shift changes.

Energy

The Ministry of Energy points out that it is the policy of the Provincial Government to reduce the growth in energy consumption to 2 per cent per annum and the growth of oil consumption to 0 per cent per capita. We are in agreement with the Ministry of Energy that the M.T.C. Environmental Assessment has not accounted for this policy, in light of the fact that transportation accounts for 50 per cent of Ontario's oil consumption. It should be pointed out that congestion increases energy consumption significantly. Further delays in the provision of a long term solution to the congestion problems in this corridor would only add to the future waste of energy and reduce the effectiveness of advancements made in more energy efficient travel modes.

Economic Development

The Ministry of Treasury and Economics suggests that an improved commuter link resulting from increased capacity in the Skyway Corridor will reduce the success of the efforts by the City of Burlington to improve its industrial assessment base and would result in increased commuter travel between Burlington and Hamilton. In Staff's opinion, this comment is not only illogical, but also indicates that the Ministry of Treasury and Economics is out of touch with the recent economic development initiatives of both Halton and the City of Burlington. The Business Development Department for Halton Region indicates that Halton is in the centre of a market to nearly six million Canadians, with direct links to the vast markets of the eastern seaboard of the United States. The Skyway Corridor and the Queen Elizabeth Way are recognized as important links to these market areas. A survey of industries in Burlington found that over 70 per cent indicated accessibility to supplies of materials, especially steel and steel components, as an advantage to their business.

APPENDIX H – Municipal Comments

The Ministry of Environment points out "the rationale for a decision to construct the proposed undertaking must lie in the assumptions as to the future programs of environmental change beyond the immediate locale or right-of-way of the undertaking proposed in the Environmental Assessment. That program or programs must include among other things economic, land use and transportation policies programs and projects". With this quote in mind, the Ministry of Treasury and Economics must recognize the vital link to the Canadian and American markets the Skyway provides, not only for Halton but for the rest of the Toronto Centred Region. If Halton is to compete in the marketplace for new jobs and assessment it must first retain what it already has. Halton's location and its transportation system and linkages are assets to be marketed, not liabilities.

Environment

The Ministry of Transportation and Communications' Environmental Assessment addresses the undertaking and its impact on the natural environment, including noise, air and water quality, wild life, unique areas, and heritage features. For the most part, the Ministry of the Environment appears to be satisfied with the Environmental Assessment as it relates to the natural environment. However, concerns were expressed regarding the impact on water quality and the Windemere Basin, with the construction of the Stage I improvements. The proposal to undertake what M.T.C. describes as a Type II assessment for all three stages appears to be acceptable to the Ministry of the Environment. These assessments would be undertaken during the detailed design phase in consultation with the Ministry of the Environment and other appropriate agencies and will be approved by the Ministry of the Environment prior to construction. The Region of Halton and its Ecological and Environmental Advisory Committee (E.E.A.C.) should be included as part of this process. This will insure the environmental policies of the Regional Plan are not compromised and that the objectives of the Halton Waterfront Plan are achieved.

Analysis of Options

The Ministry of Transportation and Communications' Environmental Assessment considered two road capacity solutions; a tunnel and the twinning of the existing Skyway Bridge. The Ministry of the Environment states that a lack of details on the tunnel alternative added to their earlier conclusion that the development of Stages II and III are not warranted.

In this matter, Halton is in full support of the Ministry of the Environment's concern. The M.T.C. has used cost as a major evaluation criteria in selecting the bridge over the tunnel option. On January 27, 1981, the Premier of Ontario announced the creation of the Board of Industrial Leadership and Development (B.I.L.D.). Contained within the Transportation section of this program are the following initiatives for Radial Roads:

> "To keep Ontario's superlative highway network attuned to increasing freight movement in the Golden Horseshoe, Ontario will invest in a long term program for radial road improvements. Over the next ten years major progress will be made on the Highway 403, 407 and 410 network".

On May 27, 1981 the Ministry of Transportation and Communications appeared as a delegation before Planning and Public Works Committee to outline the proposed plan for Hwy. 403, between Hwy. 5 in Burlington and the Hwy. 403-Q.E.W. Oakville Link. Committee was advised that some sections could be under construction as early as 1983-84. Recent discussions with Ministry staff has indicated the cost of this facility to be in the neighbourhood of 94 million dollars.

Based on the contents of the B.I.L.D. program and the new timing for Hwy. 403, fiscal restraint in the development of the Provincial freeway system is no longer a serious consideration, particularly when Halton's Official Plan calls for the construction of Hwy. 403 after the full development of the Q.E.W. in Halton has been accomplished (Section D, Policy 4 c, d, Pages 35, 36).

In any event, the cost benefit analysis for the bridge versus tunnel options requires a further review to ensure the selected option is cost effective. The cost analysis of the two options should consider the cost savings over the full life expectancy of both options rather than limiting it to the year 2001.

Finally, with the Halton Waterfront Plan now in place, a review of both options is required to ensure the achievement of the Plan objectives and proposals as they related to the Beachway Park.

Any consideration of the tunnel/bridge options should include detailed input from Halton and Hamilton-Wentworth Regions and the Cities of Burlington and Hamilton.

APPENDIX H – Municipal Comments

Conclusions

The Halton Region Official Plan supports the redevelopment of the Queen Elizabeth Way and the Skyway Corridor (Section D, Policy 4, Page 36). In addition, the Halton Region Transportation Study identified the need for both the Stage I improvements and a long term solution to the capacity problems in this corridor. The evidence shows that the problems in this corridor have existed since at least 1975 and have become intolerable since that time; hence Recommendations 1, 2 and 3.

Inasmuch that the Ministry of Environment recommends an additional Environmental Assessment for the Stages II and III improvements, and Halton's position that a review of the tunnel and bridge options is required, there is a definite need to maintain a degree of flexibility in the design of the Stage I improvements, to incorporate either the bridge or tunnel alternatives; hence Recommendation 4.

We are concerned that the current position of the Ministry of the Environment, which requests an additional Environmental Assessment for Stages II and III, will result in an additional one to two year delay until the necessary approvals are in place. As a result, completion of additional capacity improvements beyond Stage I would be delayed until as late as 1990. Halton Region does not recommend that the Environmental Assessment Act be discounted or ignored. There is adequate proof that long term capacity improvements are required in this corridor which are economically and environmentally feasible. At question are the two proposed options, the tunnel or the bridge. We fully support the Ministry of the Environment in stating the need for a further evaluation of these options. Therefore, Recommendations 5 and 6 call for the Minister of the Environment to authorize an immediate review of these options by the Ministry of Transportation and Communications, Ministry of the Environment, Regions of Halton and Hamilton-Wentworth and the Cities of Burlington and Hamilton. The results of this review would be forwarded to the Minister of the Environment and the Environmental Assessment prepared by the Ministry of Transportation and Communications could then be amended to incorporate these findings. Such a process is not only consistent with the Environmental Assessment Act, 1975, but will provide for a proper review of the alternatives in a shorter period of time than would be required to undertake a further Environmental Assessment, as recommended by the Ministry of the Environment.

Since the Skyway is a critical link in the overall Provincial freeway system in the southern Ontario region, any delay to the Stage II improvements--be they a tunnel or a bridge--could hamper the transportation initiative of the B.I.L.D. Program For this reason, Recommendation 7 is put forth.

Respectfully submitted,

R. Mohammed,
Director of Planning and Development.

DRM/ah

APPENDIX H – Municipal Comments

THE
REGIONAL MUNICIPALITY
OF
HALTON

P O BOX 7000
1151 BRONTE ROAD
OAKVILLE ONTARIO L6J 6E1
TELEPHONE AREA CODE 416

BURLINGTON)
OAKVILLE) 827-2151
MILTON)
TORONTO)

1981 11 30

Mr. Paul Askie
MTC Project Manager for the Skyway
Corridor Environmental Assessment
Ministry of Transportation & Communications
5000 Yonge Street
Willowdale, Ontario
M2N 6E9

Dear Sir:

Re: Skyway Corridor Bridge/Tunnel Presentation 81 09 23 by the Ministry of Transportation & Communications

Please be advised that Council for the Regional Municipality of Halton, at its meeting of November 18, 1981, passed the following resolution:

> "THAT the Ministry of Transportation and Communications be advised that the Regional Municipality of Halton will reserve further comment on the Skyway Corridor, Stages II and III Environmental Assessment, until the Public Review component required by the Environmental Assessment Act is completed and forwarded to the Region for comment."

Enclosed is a certified copy of the above resolution and a copy of staff report DPD 133/81.

Should you have any queries or concerns, please do not hesitate to contact Mr. Dave McCleary of the Regional Planning and Development Department at 827-2151, ext. 307.

Yours truly

F. Daruwala (Mrs.)
Assistant Recording Secretary

/fd

Encl:

cc: Regional Planning Dept.

HALTON HILLS
878-8113

GUELPH
853-0501

HAMILTON
639-4540

THE REGIONAL MUNICIPALITY OF HALTON

Report to Chairman and Members of Planning & Public Works Cmttee. Date 1981 10 29
From R. Mohammed, Director of Planning and Development
Report No. D.P.D. 133/81
Re: Skyway Corridor Bridge/Tunnel Presentation 81 09 23 by the Ministry of Transportation and Communications

RECOMMENDATION

> That the Ministry of Transportation and Communications be advised that the Regional Municipality of Halton will reserve further comment on the Skyway Corridor, Stages II and III Environmental Assessment, until the Public Review component required by the Environmental Assessment Act is completed and forwarded to the Region for comment.

EXECUTIVE SUMMARY

The Ministry of Transportation and Communications made a presentation to Committee on 81 09 23 comparing the options of a new bridge and a new tunnel for the Skyway Corridor. Staff felt that more information is required in the financial analysis of the comparison, and recommends that comments be reserved until the Public Review component of the Environmental Assessment for Skyway Corridor is completed.

REPORT

The Committee will recall that the Ministry of Transportation and Communications (M.T.C.) withdrew the Environmental Assessment 81 07 23 for the Stages II and III improvements to the Skyway Corridor from the Environmental Assessment process. The withdrawal of this portion of the Environmental Assessment was a result of the Ministry of the Environment's Review which summarizes the comments and concerns of the various Provincial Ministries and the position of the Ministry of the Environment.

On 81 09 23, Mr. Paul Askie, M.T.C. Project Manager for the Skyway Corridor Environmental Assessment and Mr. J. Sutherns of McCormick Rankin Limited presented a comparison of the bridge/tunnel options to the Planning and Public Works Committee. The options presented included a bridge (second Skyway), a tunnel with no expansion capability, a tunnel with expansion capability and a twin tunnel with the Skyway (existing) removed. The analysis of options considered cost, social impacts, traffic characteristics and the impact on the natural environment. The results of this analysis conducted by the M.T.C. appeared to indicate to the MTC that the twinning of the Skyway would be the best option to pursue.

Prior to this, Burlington and Halton staff raised a question over the financial analysis methodology and assumptions, at a meeting held 81 09 10, which the M.T.C. agreed to help resolve with further information.

A meeting was held on 81 10 09 with the M.T.C. Project Team and Halton and Burlington staff. The two basic issues raised regarding the financial analysis concerned the assumptions of the time period (life expectancy of the project) and the discount rate (difference between the rate of inflation and interest rates). The M.T.C. used a 10 percent discount rate whereas the Chief Administrative Officer of Burlington has suggested a rate of 3 percent is more realistic. Discussions with Halton's Finance Department have confirmed this contention. Currently, Regional staff are reviewing the additional information provided by M.T.C. which includes a number of financial analyses using both 10 and 3 percent discount rates over varying time periods (25 to 100 years).

Therefore, based on the presentation made to Planning and Public Works Committee by the M.T.C. on 81 09 23, Planning and Development staff are of the opinion that a final position on the bridge/tunnel option should not be established until the Public Review process required by the Environmental Assessment Act is completed in early 1982. This is to ensure that all of the relevant information is available to Regional Council in making their decision.

The Public Review process is a requirement of the Environmental Assessment Act and the establishment of a final position by Halton Regional Council, until the completion of the Review, will not delay the resolution of the capacity problems within the Skyway Corridor. Regional staff will endeavour to co-ordinate and finalize Halton's position in conjunction with the City of Burlington.

The Ministry of Transportation and Communications should be thanked for their assistance and willingness to meet with the staffs of Halton and Burlington regarding this matter.

Respectfully submitted,

R. Mohammed,
Director of Planning and Development.

APPROVED BY C.A.O.

DM:as

12

APPENDIX H - Municipal Comments

CITY OF BURLINGTON

TION PASSED BY THE CORPORATION OF THE CITY OF BURLINGTON COUNCIL

MONDAY, JUNE 22, 1981

WHEREAS the Province of Ontario Ministry of Transportation and Communications has, by way of its Environmental Assessment Report on the Burlington to Hamilton Queen Elizabeth Way Feasibility Study, identified and documented a very strong case for the need for major improvements in the Queen Elizabeth Way corridor, based on present and projected traffic volumes;

AND WHEREAS the Ministry of Transportation and Communication has addressed in sufficient detail, all elements with regard to the environmental impact of those major improvements, with the exception of the financial impact of a bridge vs. a tunnel for the Burlington Canal Crossing;

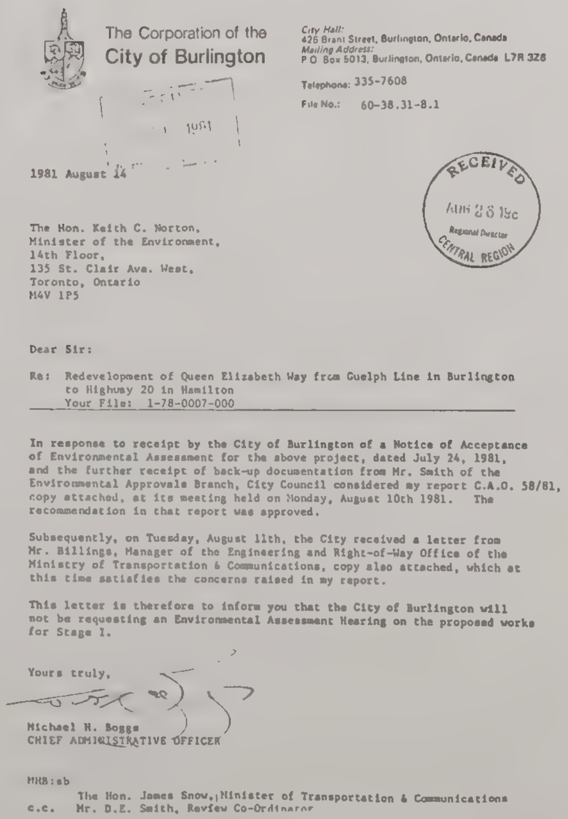
THEREFORE BE IT RESOLVED THAT the City of Burlington endorses the proposal by the Ministry of Transportation and Communications to undertake major improvements to the Queen Elizabeth Way Corridor between Guelph Line and the Burlington Canal, subject to a more detailed review with particular emphasis on the financial implications of the canal crossing being a bridge or a tunnel, without causing delay to the other identified improvements to the Corridor;

and that the improvements referred to as Stage I and Stage III proceed as quickly as possible and be designed in such a manner as to accommodate the selection of the preferred option of either the bridge or the tunnel, to be carried out in conjunction with the major improvements to the total Corridor;

and that the City of Burlington register a continued preference for a tunnel in the canal crossing, as compared to a bridge;

and that the Queen Elizabeth Way structural improvements for the Canal Crossing, whether bridge or tunnel, in Stage II be completed prior to the completion of Highway 403;

and that the Ministry of Transportation and Communications be requested to consider the removal of service on the Beach Strip Railway Spur Line as part of their improvements to the Beach Strip Corridor.



The Corporation of the
City of Burlington

City Hall:
426 Brant Street, Burlington, Ontario, Canada
Mailing Address:
P O Box 5013, Burlington, Ontario, Canada L7R 3Z6

Telephone: 335-7608

File No.: 60-38.31-8.1

1981 August 14

RECEIVED
AUG 28 19[illegible]
Regional Director
CENTRAL REGION

The Hon. Keith C. Norton,
Minister of the Environment,
14th Floor,
135 St. Clair Ave. West,
Toronto, Ontario
M4V 1P5

Dear Sir:

Re: Redevelopment of Queen Elizabeth Way from Guelph Line in Burlington
to Highway 20 in Hamilton
Your File: 1-78-0007-000

In response to receipt by the City of Burlington of a Notice of Acceptance of Environmental Assessment for the above project, dated July 24, 1981, and the further receipt of back-up documentation from Mr. Smith of the Environmental Approvals Branch, City Council considered my report C.A.O. 58/81, copy attached, at its meeting held on Monday, August 10th 1981. The recommendation in that report was approved.

Subsequently, on Tuesday, August 11th, the City received a letter from Mr. Billings, Manager of the Engineering and Right-of-Way Office of the Ministry of Transportation & Communications, copy also attached, which at this time satisfies the concerns raised in my report.

This letter is therefore to inform you that the City of Burlington will not be requesting an Environmental Assessment Hearing on the proposed works for Stage I.

Yours truly,

Michael H. Boggs
CHIEF ADMINISTRATIVE OFFICER

MHB:sb
The Hon. James Snow, Minister of Transportation & Communications
c.c. Mr. D.E. Smith, Review Co-Ordinator

APPENDIX H — Municipal Comments

CITY OF BURLINGTON

C.A.O. 58/81

1981 August 10
File: 60-38.31-8.1

Mayor R.L. Bird and Members of the
Council of the City of Burlington

Subject: Redevelopment of Queen Elizabeth Way from Guelph Line in Burlington to Highway 20 in Hamilton

RECOMMENDATION

THAT in the event appropriate documentation addressing the concerns set out in C.A.O. Report 58/81 is not received by August 13, 1981, the City of Burlington request a Hearing with respect to the undertaking referred to as the Redevelopment of the Queen Elizabeth Way between Guelph Line in Burlington and Highway 20 in Hamilton, in accordance with Section 13 of the Environmental Assessment Act,

and further that the City of Burlington will withdraw request for a Hearing, upon receipt of the aforementioned documentation subsequent to August 14, 1981.

REPORT·

At the regular Council meeting of June 22nd 1981, the City of Burlington responded to the Environmental Assessment Report prepared by the Ministry of Transportation and Communications and the Ministry of the Environment Review of that Report under the Environmental Assessment Act, with regard to the redevelopment of the Queen Elizabeth Way between Guelph Line in Burlington and Highway 20 in Hamilton. A copy of that motion is attached hereto for your information. In this recommendation, the City specifically asks for the following items:-

1. A more detailed review, with particular emphasis on the financial implications of the Canal Crossing being a Bridge or a Tunnel, be undertaken without causing delay to the other identified improvements to the Corridor.

2. The improvements referred to as Stage I and Stage III proceed as quickly as possible and be designed in such a manner as to accommodate the selection of the preferred option of either a bridge or a tunnel.

3. Consideration of the removal of rail service on the Beach Strip Spur Line.

In dealing with the Environmental Assessment, the Ministry of Transportation and Communications have withdrawn, by Notice dated July 6, 1981 (copy attached), Stages II and III from the Environmental Assessment process. It is their intention to resubmit these reports at a later date. . . accordingly, the Ministry of the Environment has dealt with the Stage I improvements, approving these, subject to the conditions set out in the Notice of Acceptance of the Environmental Assessment, (copy attached).

The conditions which have been imposed do not address the latter two areas identified above which are of concern to the City of Burlington, these being the design of the Stage I improvements to accommodate either the Bridge or the tunnel, and the removal of the Beach Strip Spur Line rail service.

The Region of Halton also submitted a proposal to the Ministry of the Environment with regard to this undertaking. They have concluded that "the condition of Stage I approval that M.T.C. consult Halton and Burlington will provide the opportunity for ensuring the flexibility of

Cont.. /2

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of tunnel or bdige option in the design of the arterial improvements." I am not satisfied that the consultation process referred to will provide that assurance and to date, I have not received that assurance from the Ministry of Transportation and Communications. I have been advised by the Ministry of the Environment officials that it is their understanding the design will provide this flexibility; however they were unable to provide me with any documentation which supported that assumption. I have, by telephone, requested the M.T.C. to look into this matter and advise me of how they will be responding to the need for this flexibility. They have indicated that a written reply to this enquiry and concern will be forthcoming; however it will not be available prior to this evening's Council meeting.

It is my analysis of this situation that the necessity for the design to include the flexibility is crucial to the undertaking. In the event the design proceeds in the manner in which they have submitted the documentation under the Environmental Assessment Report, then it appears as though the decision of a bridge instead of a tunnel (actually it is a 600 foot long aquaduct), will already have been made. Any case which can be made in favour of the aquaduct may be prejudiced and jeopardized by the fact that the Stage I improvements have been approved, without the possibility of designing and constructing an aquaduct. Accordingly I feel it is important that the City of Burlington receive appropriate documentation that the Stage I improvements do include the flexibility to proceed with a bridge or an aquaduct at Stage II. The M.T.C. officials have assured me by telephone, that this matter will be addressed in the correspondence which is forthcoming.

The other matter which is of some concern to the City of Burlington relates to the Beach Strip Spur Line and I am advised by the M.T.C. that negotiations are in process with the Federal Government and the industry which is being served by that line and that this matter is being addressed in a different forum. Whether or not these negotiations will be successful is impossible to indicate at this time and accordingly, no assurance can be given that this railway service will be removed in the near future. I think it is quite appropriate to use the improvements to the whole Beach Strip corridor as the appropriate mechanism for removing this railway service and there is little doubt that the reconstruction and the widening of the Lift Bridge over the Canal would be greatly simplified if the railway service no longer existed. It therefore seems expedient for cost and other reasons, to remove this service prior to any redevelopment or reconstruction of the Queen Elizabeth improvements and arterial, even at the Stage I level.

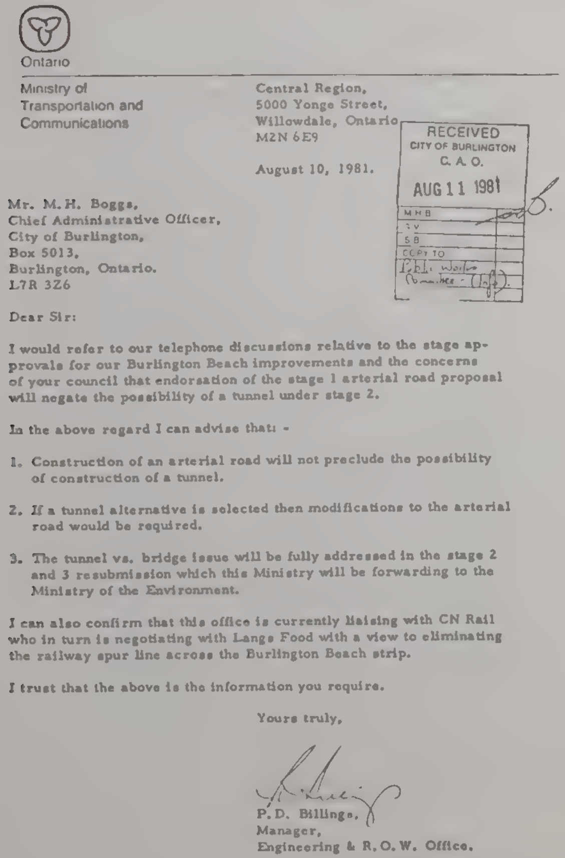
Accordingly, the above request for a Hearing will not be submitted by the City of Burlington in the event these two matters, that is the flexibility for Stage II (bridge vs. aquaduct) and the removal of railway service on the Beach Strip, are resolved and appropriate documentation is made available to the City of Burlington by August 13, 1981, in answer to these concerns and giving some assurance that these matters are being accommodated in the Stage I improvements.

As the deadline for requesting a hearing is August 17, 1981, and in the event the requested documentation is not received by August 13, 1981, I am suggesting that the City file a request for a hearing on August 14, 1981. If the appropriate documentation is received after August [illegible] 1981 and the request for a hearing has been filed, the City could then withdraw this request in order that the improvements can proceed expeditiously.

Respectfully submitted,

Michael H. [illegible]
CHIEF ADMINISTRATIVE OFFICER

APPENDIX H – Municipal Comments



Ontario

Ministry of
Transportation and
Communications

Central Region,
5000 Yonge Street,
Willowdale, Ontario
M2N 6E9

RECEIVED
CITY OF BURLINGTON
C. A. O.
AUG 11 1981
M H B
S V
S B
COPY TO
Pbl. Works
Committee - (Info).

August 10, 1981.

Mr. M. H. Boggs,
Chief Administrative Officer,
City of Burlington,
Box 5013,
Burlington, Ontario.
L7R 3Z6

Dear Sir:

I would refer to our telephone discussions relative to the stage approvals for our Burlington Beach improvements and the concerns of your council that endorsation of the stage 1 arterial road proposal will negate the possibility of a tunnel under stage 2.

In the above regard I can advise that: -

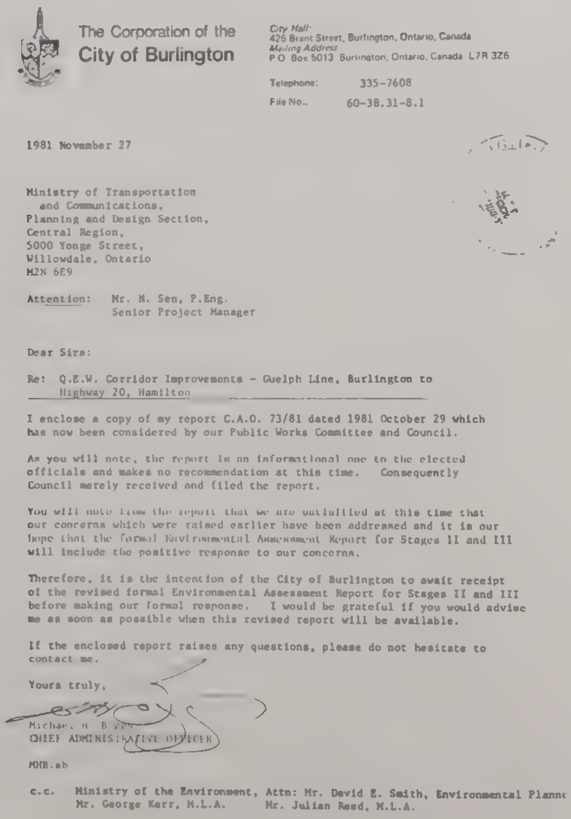
1. Construction of an arterial road will not preclude the possibility of construction of a tunnel.
2. If a tunnel alternative is selected then modifications to the arterial road would be required.
3. The tunnel vs. bridge issue will be fully addressed in the stage 2 and 3 resubmission which this Ministry will be forwarding to the Ministry of the Environment.

I can also confirm that this office is currently liaising with CN Rail who in turn is negotiating with Langs Food with a view to eliminating the railway spur line across the Burlington Beach strip.

I trust that the above is the information you require.

Yours truly,

P. D. Billings,
Manager,
Engineering & R. O. W. Office.



The Corporation of the
City of Burlington

City Hall:
426 Brant Street, Burlington, Ontario, Canada
Mailing Address
P O Box 5013 Burlington, Ontario, Canada L7R 3Z6

Telephone: 335-7608
File No.: 60-38.31-8.1

1981 November 27

Ministry of Transportation
and Communications,
Planning and Design Section,
Central Region,
5000 Yonge Street,
Willowdale, Ontario
M2N 6E9

Attention: Mr. N. Sen, P.Eng.
Senior Project Manager

Dear Sirs:

Re: Q.E.W. Corridor Improvements – Guelph Line, Burlington to Highway 20, Hamilton

I enclose a copy of my report C.A.O. 73/81 dated 1981 October 29 which has now been considered by our Public Works Committee and Council.

As you will note, the report is an informational one to the elected officials and makes no recommendation at this time. Consequently Council merely received and filed the report.

You will note from the report that we are satisfied at this time that our concerns which were raised earlier have been addressed and it is our hope that the formal Environmental Assessment Report for Stages II and III will include the positive response to our concerns.

Therefore, it is the intention of the City of Burlington to await receipt of the revised formal Environmental Assessment Report for Stages II and III before making our formal response. I would be grateful if you would advise me as soon as possible when this revised report will be available.

If the enclosed report raises any questions, please do not hesitate to contact me.

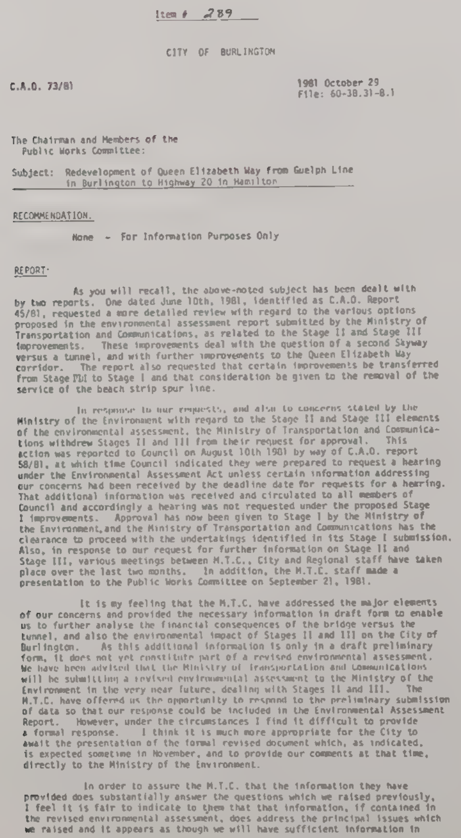
Yours truly,

Michael H. Boggs
CHIEF ADMINISTRATIVE OFFICER

MHB.sb

c.c. Ministry of the Environment, Attn: Mr. David E. Smith, Environmental Planne
Mr. George Kerr, M.L.A. Mr. Julian Reed, M.L.A.

APPENDIX H – Municipal Comments



Item # 289

CITY OF BURLINGTON

C.A.O. 73/81

1981 October 29
File: 60-38.31-8.1

The Chairman and Members of the
Public Works Committee:

Subject: Redevelopment of Queen Elizabeth Way from Guelph Line in Burlington to Highway 20 in Hamilton

RECOMMENDATION.

None - For Information Purposes Only

REPORT·

As you will recall, the above-noted subject has been dealt with by two reports. One dated June 10th, 1981, identified as C.A.O. Report 45/81, requested a more detailed review with regard to the various options proposed in the environmental assessment report submitted by the Ministry of Transportation and Communications, as related to the Stage II and Stage III improvements. These improvements deal with the question of a second Skyway versus a tunnel, and with further improvements to the Queen Elizabeth Way corridor. The report also requested that certain improvements be transferred from Stage III to Stage I and that consideration be given to the removal of the service of the beach strip spur line.

In response to our requests, and also to concerns stated by the Ministry of the Environment with regard to the Stage II and Stage III elements of the environmental assessment, the Ministry of Transportation and Communications withdrew Stages II and III from their request for approval. This action was reported to Council on August 10th 1981 by way of C.A.O. report 58/81, at which time Council indicated they were prepared to request a hearing under the Environmental Assessment Act unless certain information addressing our concerns had been received by the deadline date for requests for a hearing. That additional information was received and circulated to all members of Council and accordingly a hearing was not requested under the proposed Stage I improvements. Approval has now been given to Stage I by the Ministry of the Environment, and the Ministry of Transportation and Communications has the clearance to proceed with the undertakings identified in its Stage I submission. Also, in response to our request for further information on Stage II and Stage III, various meetings between M.T.C., City and Regional staff have taken place over the last two months. In addition, the M.T.C. staff made a presentation to the Public Works Committee on September 21, 1981.

It is my feeling that the M.T.C. have addressed the major elements of our concerns and provided the necessary information in draft form to enable us to further analyse the financial consequences of the bridge versus the tunnel, and also the environmental impact of Stages II and III on the City of Burlington. As this additional information is only in a draft preliminary form, it does not yet constitute part of a revised environmental assessment. We have been advised that the Ministry of Transportation and Communications will be submitting a revised environmental assessment to the Ministry of the Environment in the very near future, dealing with Stages II and III. The M.T.C. have offered us the opportunity to respond to the preliminary submission of data so that our response could be included in the Environmental Assessment Report. However, under the circumstances I find it difficult to provide a formal response. I think it is much more appropriate for the City to await the presentation of the formal revised document which, as indicated, is expected sometime in November, and to provide our comments at that time, directly to the Ministry of the Environment.

In order to assure the M.T.C. that the information they have provided does substantially answer the questions which we raised previously, I feel it is fair to indicate to them that that information, if contained in the revised environmental assessment, does address the principal issues which we raised and it appears as though we will have sufficient information in

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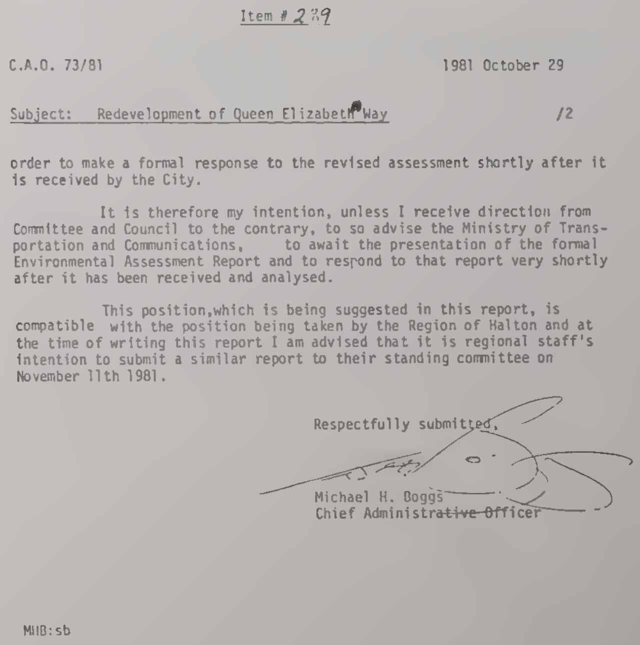


Item # 289

C.A.O. 73/81

1981 October 29

Subject: Redevelopment of Queen Elizabeth Way /2

order to make a formal response to the revised assessment shortly after it is received by the City.

It is therefore my intention, unless I receive direction from Committee and Council to the contrary, to so advise the Ministry of Transportation and Communications, to await the presentation of the formal Environmental Assessment Report and to respond to that report very shortly after it has been received and analysed.

This position, which is being suggested in this report, is compatible with the position being taken by the Region of Halton and at the time of writing this report I am advised that it is regional staff's intention to submit a similar report to their standing committee on November 11th 1981.

Respectfully submitted,

Michael H. Boggs
Chief Administrative Officer

MHB:sb

APPENDIX H – Municipal Comments

REGIONAL MUNICIPALITY OF HAMILTON–WENTWORTH

REFERRED TO IN SECTION 1 OF THE
TWELFTH REPORT OF THE TRANSPORT
AND ENVIRONMENT COMMITTEE

BRIEF

TO

THE HONOURABLE KEITH NORTON

MINISTER OF THE ENVIRONMENT

REGARDING THE

QUEEN ELIZABETH WAY REDEVELOPMENT

-BURLINGTON TO HAMILTON

E.A. FILE 1-78-0007-000

SUBMITTED BY:

THE COUNCIL OF

THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH

JUNE 16, 1981

QUEEN ELIZABETH WAY REDEVELOPMENT
-BURLINGTON TO HAMILTON
E.A. FILE 1-78-0007-000

An Environmental Assessment Report has been submitted by the Minister of Transportation and Communications to the Minister of the Environment for the redevelopment of the Queen Elizabeth Way between Guelph Line in Burlington and Highway #20 in Hamilton. The report has been reviewed by the Minister of the Environment in conjunction with various other ministries and agencies of the Province of Ontario. The review makes certain recommendations to the Minister of the Environment which have been published and circularized for comment.

The review of the Ministry of the Environment has concluded that only Stage 1 should be given conditional approval and that the rationale for the size, nature and timing of improvements beyond Stage 1 is subject to a further Environmental Assessment Report. In other words, the Environmental Assessment Report submitted on December 11, 1979, in the opinion of the review staff, has not shown the need for major improvements to the Queen Elizabeth Way.

This brief addresses the following from a Regional perspective:

A. Existing Traffic Conditions
B. Compatibility with Official Plan
C. Staging of the Project
D. Planning and Integration with the Regional Road System

APPENDIX H – Municipal Comments

A. EXISTING TRAFFIC CONDITIONS

Existing traffic volumes on the Queen Elizabeth Way between Burlington and Hamilton frequently reach the capacity of the Skyway and the Highway is operating at an unacceptable level of service, leading to traffic congestion and delays.. The traffic congestion at this location is also compounded by the lack of provision for truck traffic, inadequate grades and non-existent shoulder clearances on the bridge. Truck traffic in this corridor is a significant percentage of the total traffic (12% during the peak hour) and consists of a combination of international, provincial and regional trucking.

Numerous accidents and vehicular breakdowns result in the closure of the Skyway Corridor. In addition, inclement weather conditions also dictate the closure of the Skyway so that heavy volumes of traffic are diverted onto the Regional Road System. This diversion of traffic is onto residential streets which is at times intolerable.

B. COMPATIBILITY WITH OFFICIAL PLAN

The Regional Official Plan and related Regional Transportation Studies indicate that the volume of traffic will continue to grow, further aggravating the existing unacceptable level of service provided in this corridor.

The Region's Official Plan states that industrial growth is to be provided for in the proximity of the Queen Elizabeth Way and that generally development will continue to expand within the Region. The Official Plan contains specific policies to encourage the Provincial Government to provide additional highway capacity between this Region and points east via the Queen Elizabeth Way/Skyway Corridor. Therefore, in our opinion, the rationale for a decision to construct the proposed undertaking is in total agreement with the assumptions as to the future programmes of environmental change beyond the immediate locale of the undertaking proposed in the Environmental Assessment. A decision not to provide more capacity in this corridor will have a negative impact on traffic flows as well as constrain the industrial development in the Region of Hamilton-Wentworth, in the City of Hamilton and in the Town of Stoney Creek.

It is also our understanding that a similar situation exists relative to our neighbours, the Region of Halton and the City of Burlington. Indeed, the various Official Plans not only allow for the proposed Queen Elizabeth Way improvements, but in many respects require the improvements. Indeed, it is our opinion that this corridor is a vital link and with its existing capacity, is a constraint to the vitality of trade, commerce, industrial and tourist traffic for all of Southern Ontario.

C. STAGING OF THE PROJECT

The City and the Region see the need for the entire project in this corridor as outlined in the plans by the Ministry of Transportation and Communications. Implementation of only

APPENDIX H – Municipal Comments

Stage 1 of this project will only partially relieve the commuter traffic between Hamilton and Burlington and will not be able to accommodate the large volumes of through traffic. Stage 1 without Stage 2 will be particularly detrimental to the Region and the City of Hamilton. Stage 1, only partially relieving the existing congestion problem, will still require that the overflow traffic and that traffic in times of emergency and breakdown, be re-routed onto Regional roads. This arrangement is considered unacceptable.

It is indicated in the review document that building the entire Stage 2 improvement would provide for greater capacity than is necessary for the existing volumes. It must be remembered that the scope, scale and type of construction contemplated in Stage 2 will take many years to complete. Upon its completion there must be sufficient capacity available to meet future traffic demands so that a further widening is not then required starting the whole process all over again. Furthermore, it is our opinion that it would be impractical to construct only part of a bridge whereas, it is contemplated that the capacity in freeway lanes can be deferred to Stage 3.

It was also suggested that additional capacity be provided by varying "Operating Capacity Factors", rather than implementing Stage 2. The Ministry of Transportation and Communications has indicated that a number of operational modifications that can provide marginal improvements will be implemented at an early stage in the redevelopment. The Region has carried out a systems study with these "Operating Capacity Factors" as parameters and concluded that they would have a limited impact on the traffic volume in this corridor.

In keeping with the Region's Policy on promoting Transit Usage, the Ministry of Transportation and Communications has also considered the effect of this usage and determined that there would be no significant relief to the traffic on the Skyway Corridor resulting from transit usage. Independently, the Region studying the use of transit has drawn the same conclusions through its studies.

In summary, all of the necessary operational changes and transit improvements, collectively, will not negate the need for the widening as proposed in Stage 2. Furthermore, the Region has concluded that Stage 2 of the project is warranted now!

D. PLANNING AND INTEGRATION WITH THE REGIONAL ROAD SYSTEM

The Ministry of Transportation and Communication's "Provisional Roadways, Long Range Perspective, 1980", contains the following statement: "Travel Characteristics measured in the 1970's will prevail into the future". The travel demand forecasts prepared by the Region compares favourably with the travel demands extrapolated based on historical trends.

APPENDIX H – Municipal Comments

In their Environmental Assessment Report the Ministry of Transportation and Communications has assumed for the basis of its calculations that the highway network does not include the Redhill Creek Freeway, the Mountain Freeway nor the Industrial Perimeter Road. Regional Studies have indicated that the Redhill Creek Freeway and the Mountain Freeway system will not significantly introduce additional traffic over and above the existing demand in this corridor nor will they significantly divert traffic from the Skyway Corridor. Therefore, an analysis of the Corridor excluding these potential improvements from the highway network would give a realistic representation of the need for the specific improvements in this Corridor.

In the same manner, the Industrial Perimeter Road will provide capacity for the demand and specifically the truck demand presently being accommodated by the East-West Arterials through the City of Hamilton. It is not the intention to construct a roadway for the purpose of relieving the Provincial Highway system. The diversion of traffic from the Skyway to the Industrial Perimeter Road could only be realized at the additional expense to drivers, in both time and fuel, and with grave social and environmental disruption on the neighbourhoods within the City of Hamilton.

The Region of Hamilton-Wentworth has recognized the Skyway and its redevelopment, as proposed by the Ministry of Transportation and Communications, as part of the Integrated Road Network and Land Use Development in this area. For example, the "Beach Strip" planning of a park in this area has recognized this transportation corridor and the Ministry of Transportation and Communication's recommendation for widening.

SUMMARY:

It is the Region of Hamilton-Wentworth's opinion:

1. That Stage 1 and Stage 2 are needed now!

2. That by participating in this study with the Ministry of Transportation and Communications, the Ministry of the Environment has had sufficient time to make their concerns known and have them addressed by the Ministry of Transportation and Communications.

RECOMMENDATIONS:

1. That the Regional Chairman forward this Brief to the Minister of the Environment.

2. That the Minister of the Environment be advised that the Ministry of Transportation and Communication's submission is in accordance with and required for the Region of Hamilton-Wentworth's Official Plan and is compatible with the policies and intentions of the Area Municipalities within the Region.

3. That the Region supports the proposal of the Ministry of Transportation and Communications to redevelop the Queen

Elizabeth Way between the Guelph Line in Burlington and Highway #20 in Hamilton as recommended in their Environmental Assessment Report - Type I.

4. a) That the Region requests the Minister of the Environment to approve of the Ministry of Transportation and Communication's submission for all three (3) stages of the Queen Elizabeth Way widening permitting property acquisition leading to the ultimate completion of the project and to permit the Province to proceed with this project.

b) That the Region requests the Minister of the Environment to approve the proposal in accordance with the schedule as submitted by the Ministry of Transportation and Communications.

THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH
Department of Engineering
71 Main Street West, Hamilton, Ont L8N 3T4 (416) 526-4170

81 12 04

Refer to File No T111-22
Attention of L. Franco
Your File No

The Honourable James Snow
Minister of Transportation and Communications
Queen's Park Offices
Ferguson Block
77 Wellesley Street
Toronto, Ontario
M7A 1Z8

Queen Elizabeth Way Redevelopment
Guelph Line (Burlington) and Hwy. #20 (Hamilton)

Dear Sir:

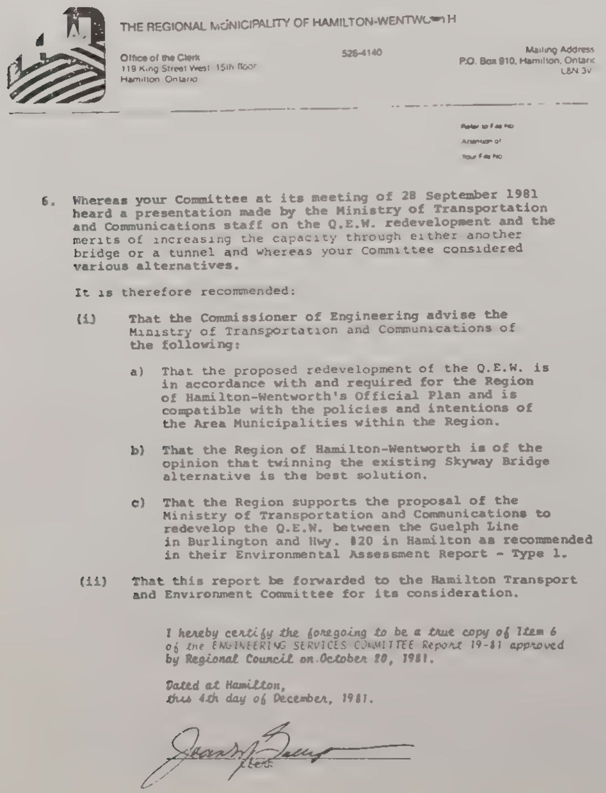
Attached for your information, is a certified copy of Item 6 of Report 19-81 of the Engineering Services Committee with respect to the above-mentioned.

Yours very truly,

L. Franco, Secretary
Engineering Services Committee

/co
Attach.

APPENDIX H – Municipal Comments



THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH

Office of the Clerk
119 King Street West 15th floor
Hamilton Ontario

526-4140

Mailing Address
P.O. Box 910, Hamilton, Ontario
L8N 3V

Refer to File No
Attention of
Your File No

6. Whereas your Committee at its meeting of 28 September 1981 heard a presentation made by the Ministry of Transportation and Communications staff on the Q.E.W. redevelopment and the merits of increasing the capacity through either another bridge or a tunnel and whereas your Committee considered various alternatives.

It is therefore recommended:

(i) That the Commissioner of Engineering advise the Ministry of Transportation and Communications of the following:

  a) That the proposed redevelopment of the Q.E.W. is in accordance with and required for the Region of Hamilton-Wentworth's Official Plan and is compatible with the policies and intentions of the Area Municipalities within the Region.

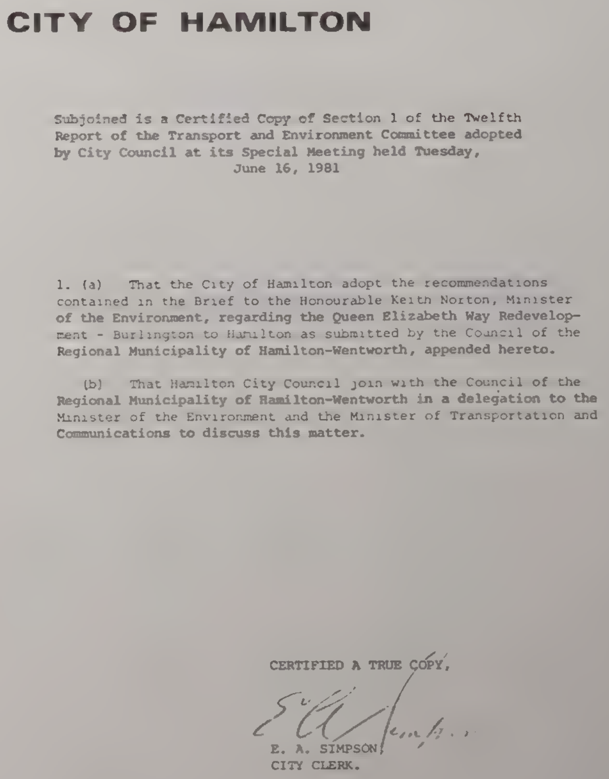
  b) That the Region of Hamilton-Wentworth is of the opinion that twinning the existing Skyway Bridge alternative is the best solution.

  c) That the Region supports the proposal of the Ministry of Transportation and Communications to redevelop the Q.E.W. between the Guelph Line in Burlington and Hwy. #20 in Hamilton as recommended in their Environmental Assessment Report - Type 1.

(ii) That this report be forwarded to the Hamilton Transport and Environment Committee for its consideration.

I hereby certify the foregoing to be a true copy of Item 6 of the ENGINEERING SERVICES COMMITTEE Report 19-81 approved by Regional Council on October 20, 1981.

*Dated at Hamilton,
this 4th day of December, 1981.*



CITY OF HAMILTON

Subjoined is a Certified Copy of Section 1 of the Twelfth Report of the Transport and Environment Committee adopted by City Council at its Special Meeting held Tuesday,
June 16, 1981

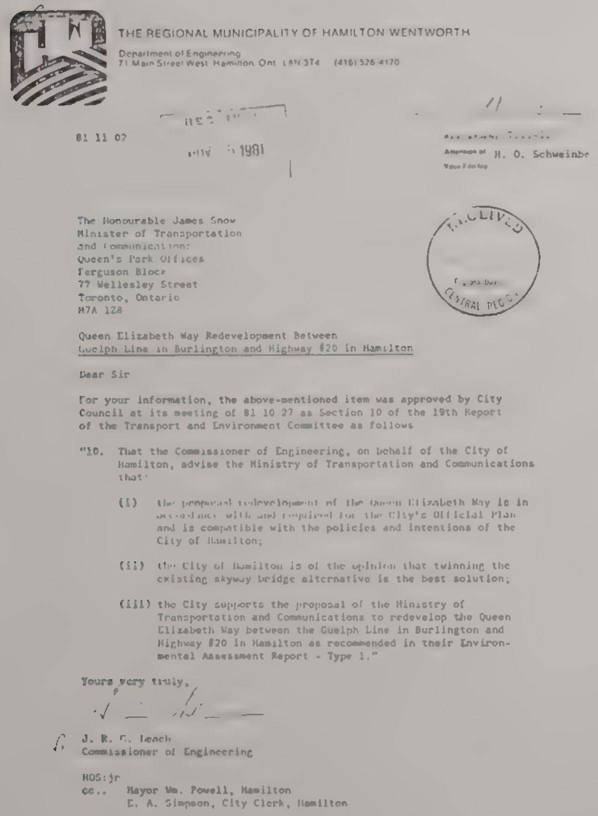
1. (a) That the City of Hamilton adopt the recommendations contained in the Brief to the Honourable Keith Norton, Minister of the Environment, regarding the Queen Elizabeth Way Redevelopment - Burlington to Hamilton as submitted by the Council of the Regional Municipality of Hamilton-Wentworth, appended hereto.

(b) That Hamilton City Council join with the Council of the Regional Municipality of Hamilton-Wentworth in a delegation to the Minister of the Environment and the Minister of Transportation and Communications to discuss this matter.

CERTIFIED A TRUE COPY,

E. A. SIMPSON,
CITY CLERK.

APPENDIX H – Municipal Comments



THE REGIONAL MUNICIPALITY OF HAMILTON WENTWORTH

Department of Engineering
71 Main Street West Hamilton Ont L8N 3T4 (416) 526-4170

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NOV 5 1981

Attention of H. O. Schweinbe

RECEIVED
CENTRAL REG

The Honourable James Snow
Minister of Transportation
and Communications
Queen's Park Offices
Ferguson Block
77 Wellesley Street
Toronto, Ontario
M7A 1Z8

Queen Elizabeth Way Redevelopment Between
Guelph Line in Burlington and Highway #20 in Hamilton

Dear Sir

For your information, the above-mentioned item was approved by City Council at its meeting of 81 10 27 as Section 10 of the 19th Report of the Transport and Environment Committee as follows

"10. That the Commissioner of Engineering, on behalf of the City of Hamilton, advise the Ministry of Transportation and Communications that:

(i) the proposed redevelopment of the Queen Elizabeth Way is in accordance with and required for the City's Official Plan and is compatible with the policies and intentions of the City of Hamilton;

(ii) the City of Hamilton is of the opinion that twinning the existing skyway bridge alternative is the best solution;

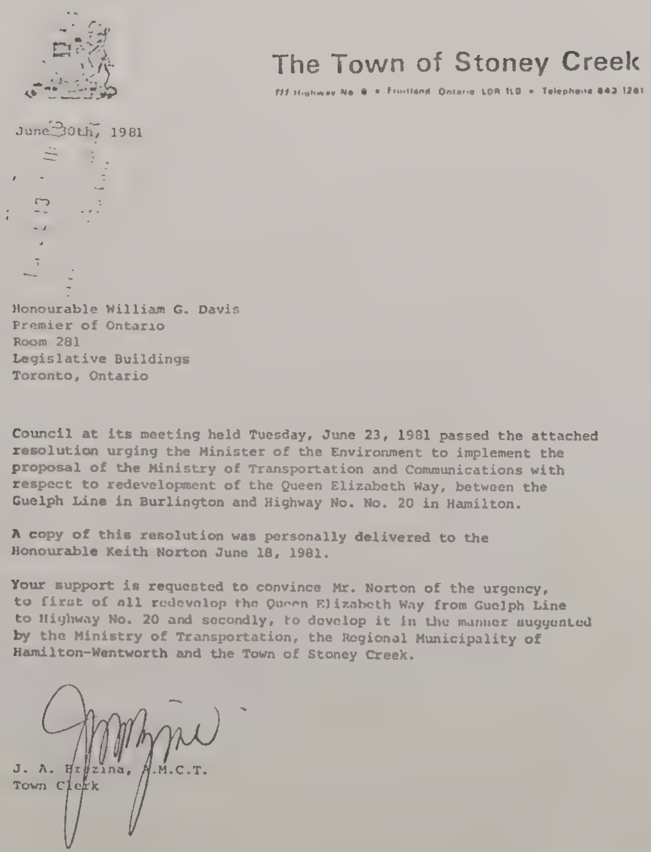
(iii) the City supports the proposal of the Ministry of Transportation and Communications to redevelop the Queen Elizabeth Way between the Guelph Line in Burlington and Highway #20 in Hamilton as recommended in their Environmental Assessment Report - Type 1."

Yours very truly,

J. R. C. Leach
Commissioner of Engineering

HOS:jr
cc.. Mayor Wm. Powell, Hamilton
E. A. Simpson, City Clerk, Hamilton

TOWN OF STONEY CREEK



The Town of Stoney Creek

777 Highway No. 8 • Fruitland Ontario L0R 1L0 • Telephone 643 1261

June 30th, 1981

Honourable William G. Davis
Premier of Ontario
Room 281
Legislative Buildings
Toronto, Ontario

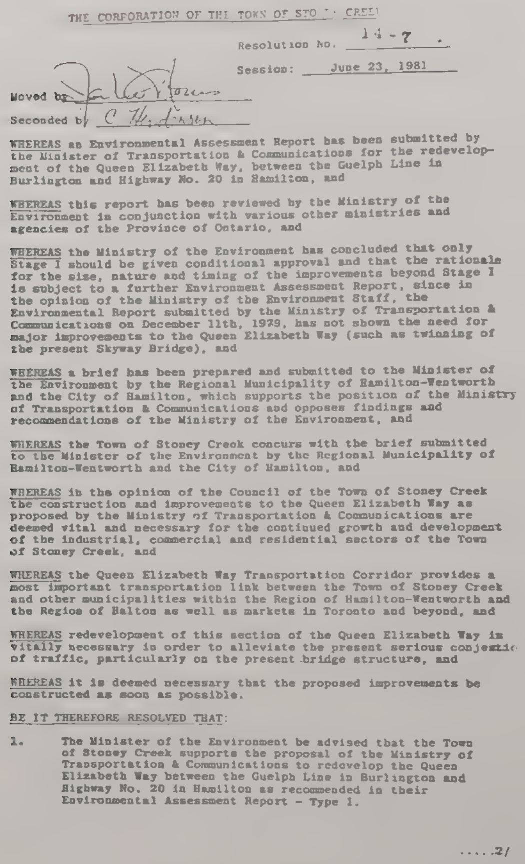
Council at its meeting held Tuesday, June 23, 1981 passed the attached resolution urging the Minister of the Environment to implement the proposal of the Ministry of Transportation and Communications with respect to redevelopment of the Queen Elizabeth Way, between the Guelph Line in Burlington and Highway No. No. 20 in Hamilton.

A copy of this resolution was personally delivered to the Honourable Keith Norton June 18, 1981.

Your support is requested to convince Mr. Norton of the urgency, to first of all redevelop the Queen Elizabeth Way from Guelph Line to Highway No. 20 and secondly, to develop it in the manner suggested by the Ministry of Transportation, the Regional Municipality of Hamilton-Wentworth and the Town of Stoney Creek.

J. A. Brezina, A.M.C.T.
Town Clerk

APPENDIX H – Municipal Comments



THE CORPORATION OF THE TOWN OF STONEY CREEK

Resolution No. 14-7 .

Session: June 23, 1981

Moved by

Seconded by

WHEREAS an Environmental Assessment Report has been submitted by the Minister of Transportation & Communications for the redevelopment of the Queen Elizabeth Way, between the Guelph Line in Burlington and Highway No. 20 in Hamilton, and

WHEREAS this report has been reviewed by the Ministry of the Environment in conjunction with various other ministries and agencies of the Province of Ontario, and

WHEREAS the Ministry of the Environment has concluded that only Stage I should be given conditional approval and that the rationale for the size, nature and timing of the improvements beyond Stage I is subject to a further Environment Assessment Report, since in the opinion of the Ministry of the Environment Staff, the Environmental Report submitted by the Ministry of Transportation & Communications on December 11th, 1979, has not shown the need for major improvements to the Queen Elizabeth Way (such as twinning of the present Skyway Bridge), and

WHEREAS a brief has been prepared and submitted to the Minister of the Environment by the Regional Municipality of Hamilton-Wentworth and the City of Hamilton, which supports the position of the Ministry of Transportation & Communications and opposes findings and recommendations of the Ministry of the Environment, and

WHEREAS the Town of Stoney Creek concurs with the brief submitted to the Minister of the Environment by the Regional Municipality of Hamilton-Wentworth and the City of Hamilton, and

WHEREAS in the opinion of the Council of the Town of Stoney Creek the construction and improvements to the Queen Elizabeth Way as proposed by the Ministry of Transportation & Communications are deemed vital and necessary for the continued growth and development of the industrial, commercial and residential sectors of the Town of Stoney Creek, and

WHEREAS the Queen Elizabeth Way Transportation Corridor provides a most important transportation link between the Town of Stoney Creek and other municipalities within the Region of Hamilton-Wentworth and the Region of Halton as well as markets in Toronto and beyond, and

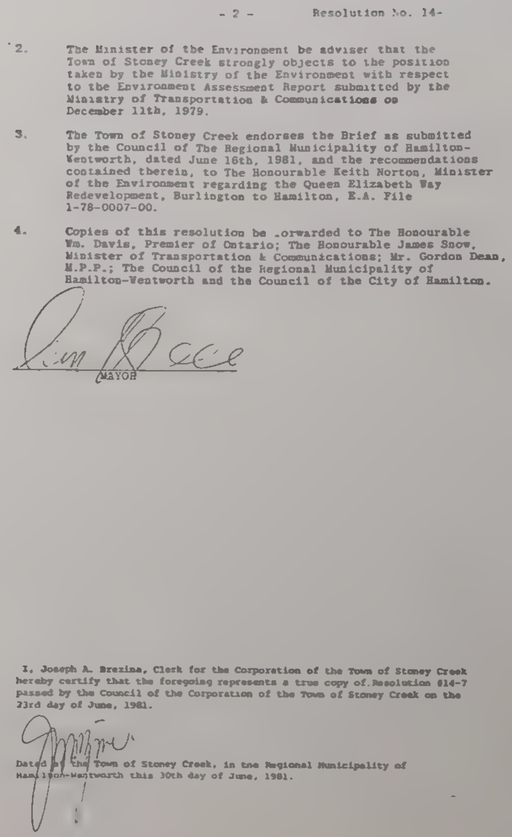
WHEREAS redevelopment of this section of the Queen Elizabeth Way is vitally necessary in order to alleviate the present serious conjestion of traffic, particularly on the present bridge structure, and

WHEREAS it is deemed necessary that the proposed improvements be constructed as soon as possible.

BE IT THEREFORE RESOLVED THAT:

1. The Minister of the Environment be advised that the Town of Stoney Creek supports the proposal of the Ministry of Transportation & Communications to redevelop the Queen Elizabeth Way between the Guelph Line in Burlington and Highway No. 20 in Hamilton as recommended in their Environmental Assessment Report – Type 1.

.....2/



- 2 - Resolution No. 14-

2. The Minister of the Environment be advised that the Town of Stoney Creek strongly objects to the position taken by the Ministry of the Environment with respect to the Environment Assessment Report submitted by the Ministry of Transportation & Communications on December 11th, 1979.

3. The Town of Stoney Creek endorses the Brief as submitted by the Council of The Regional Municipality of Hamilton-Wentworth, dated June 16th, 1981, and the recommendations contained therein, to The Honourable Keith Norton, Minister of the Environment regarding the Queen Elizabeth Way Redevelopment, Burlington to Hamilton, E.A. File 1-78-0007-00.

4. Copies of this resolution be forwarded to The Honourable Wm. Davis, Premier of Ontario; The Honourable James Snow, Minister of Transportation & Communications; Mr. Gordon Dean, M.P.P.; The Council of the Regional Municipality of Hamilton-Wentworth and the Council of the City of Hamilton.

MAYOR

I, Joseph A. Brezina, Clerk for the Corporation of the Town of Stoney Creek hereby certify that the foregoing represents a true copy of Resolution #14-7 passed by the Council of the Corporation of the Town of Stoney Creek on the 23rd day of June, 1981.

Dated at the Town of Stoney Creek, in the Regional Municipality of Hamilton-Wentworth this 30th day of June, 1981.

APPENDIX H – Municipal Comments

REGIONAL MUNICIPALITY OF NIAGARA

THE REGIONAL MUNICIPALITY OF NIAGARA

OFFICE OF THE CLERK

[illegible]
[illegible]
[illegible]

August 7, 1981.
PW 25
DEA 150-3

Mrs. J. M. Gallipeau,
Clerk, Hamilton-Wentworth,
P. O. Box 910,
100 Main St. East,
Hamilton, Ontario.
L8N 3V9

Re: Resolution - Twinning of the Burlington Bay Skyway

Dear Mrs. Gallipeau,

At its meeting of August 6, 1981, the Council of the Regional Municipality of Niagara approved the recommendation of the Public Works and Utilities Committee:

> "That the Regional Municipality of Hamilton-Wentworth and the Ministry of Transportation and Communications be advised that the Regional Municipality of Niagara supports the need for the twinning of the Burlington Bay Skyway, and further
>
> That the Ministry of Environment be requested to seriously consider the implications of a delay in proceeding with the plans for such improvement."

A copy of background Report DEA 150-3 is attached herewith for your reference.

Yours very truly,

Allan Pierson,
AMCT (A),
Assistant Regional Clerk.

AP:SC
Encl.

DEA-150, Item 3
1981 07 23

REGIONAL MUNICIPALITY OF NIAGARA

PUBLIC WORKS DEPARTMENT

Report to: Mr. L. Lemelin, Chairman, and Members of the Public Works and Utilities Committee

Councillors:

Twinning of the Burlington Bay Skyway

The following recommendation is submitted for Committee's consideration:

> That the Regional Municipality of Hamilton-Wentworth and the Ministry of Transportation and Communications be advised that the Regional Municipality of Niagara supports the need for the twinning of the Burlington Bay Skyway, and further
>
> That the Ministry of Environment be requested to seriously consider the implications of a delay in proceeding with the plans for such improvement.

Item 11 of DEC-145 is the attached letter from the Regional Chairman of the Regional Municipality of Hamilton-Wentworth asking for the Niagara Region to support the Hamilton-Wentworth Region and in turn the Ministry of Transportation and Communications in substantiating the need for the twinning of the Burlington Bay Skyway.

The Burlington Bay Skyway provides a vital link between the QEW and its connecting arterial roads in the Niagara Region and the other major expressways and arterial highways to Toronto and other major areas in Ontario. The Ministry of Transportation and Communications has conducted functional studies and is proposing to twin the existing facility, in order to provide additional lanes to handle the projected traffic volumes. The Ministry of Environment apparently has indicated that they are not satisfied with the justification for this project and have asked for additional substantiating documentation. This report is prepared in order to delineate the interest that the Niagara Region would have in improvements to the above structure.

A vast majority of the products of the agricultural industry in the Niagara Region is transported along the QEW and over the Burlington Bay Skyway. This includes, in addition to the tender fruits, the products from dairying and poultry and hog farming. While not all of the products are shipped over the Burlington Bay Skyway, a vast majority are shipped this way through to the Toronto market and other markets. A vast majority of the manufacturing products from the Niagara Region are shipped along the QEW and over the Burlington Skyway. As well, products that are required for industry in the Niagara Region are shipped into the Niagara Region using the same route. This includes, not only automotive products, the major industry in the Region, but other products as well.

One of the reasons commonly given for the location of industry in the Niagara Region is its excellent transportation facilities in proximity to the U.S. markets and the major Ontario markets. The fact that the Niagara Peninsula serves as a land bridge between the Northeast United States and the Southern Ontario and Central United States markets is demonstrated in the numbers of truck traffic using this corridor. The Niagara/Lake Erie transportation study completed in 1976 indicates a substantial number of (L) license movements through Ontario using the QEW Corridor and the Burlington Skyway. This report also shows the Burlington Bay Skyway as carrying the highest volume of 1971 daily truck traffic of any road in the Niagara/Lake Erie transportation study area.

The Burlington Bay Skyway also carries the highest amount of daily passenger volume on inter-urban bus systems of any section of highway in the same area.

Many of the residents in the Niagara Region have chosen to live here because of the excellent commuting facilities to their places of employment on the other side of the Burlington Bay Skyway. While some of this commuting is by train, the vast majority is by bus and private auto.

Those of us who use the Burlington Bay Skyway on a fairly regular basis can recount many instances when traffic has been stopped or severely slowed up on the Skyway sometimes due to accidents, but quite often due to severe traffic congestion. It requires only a slight slow-down of traffic to result in a massive traffic jam. We are also well aware of the potential problems caused by accidents involving transports hauling hazardous materials on this structure.

It is our understanding that the Ministry of Environment has indicated concern as to the environmental impact of twinning the structure. We would suggest that concern should also be registered as to the environmental impacts that will result if the structure is not twinned. These impacts could be caused by the following:

> Air pollution, caused by vehicles idling during traffic jams; environmental damage caused by spillage of materials as a result of accidents caused by insufficient capacity on the bridge to handle heavy traffic, and possible environmental impacts on other routes which may be used by traffic if the traffic is unable to use the Burlington Bay Skyway.

In addition, we would suggest that the failure to provide sufficient capacity on the Burlington Bay Skyway would have a significant economic impact on the Niagara Region. It would discourage employees from other areas from establishing residences in the Niagara Region. It could have an impact on the marketing of fresh fruits and other agricultural products in the Toronto area. It could have a significant impact on the through movement of goods by trucks. It could divert traffic to other provincial highways and arterial roads requiring significant expenditures for upgrading those roads with some potential environmental effects.

We would suggest that the Niagara Region is vitally interested in ensuring that adequate capacity is provided at the Burlington Bay Skyway, in order that Niagara residents and Niagara industries will not be deprived of proper access through this facility.

Prepared by:

William C. Holman, P.Eng.
Research Engineer

Respectfully submitted:

Conrad H. Eidt, P.Eng.
Director of Engineering

WCH:ph
Attach.

APPENDIX H – Municipal Comments

May 29, 1981

Chairman John E. Campbell
Regional Municipality of Niagara
150 Berryman Avenue
St. Catharines, Ontario

Dear John:

As you probably know there is a report from the Ministry of the Environment that the Ministry of Transportation and Communications has not substantiated the need for the twinning of the Skyway. Just this morning, as you know, there was a great tie-up on the Niagara QEW for the simple reason that there was a truck stalled on the bridge. Traffic was tied-up for miles.

It would seem to me to be of great interest to your community as well as to ours, to have proper communications between the border and Toronto, and I would hope that you and your Council would undertake to support us on this matter.

Warmest regards.

Research for report
DEC-145

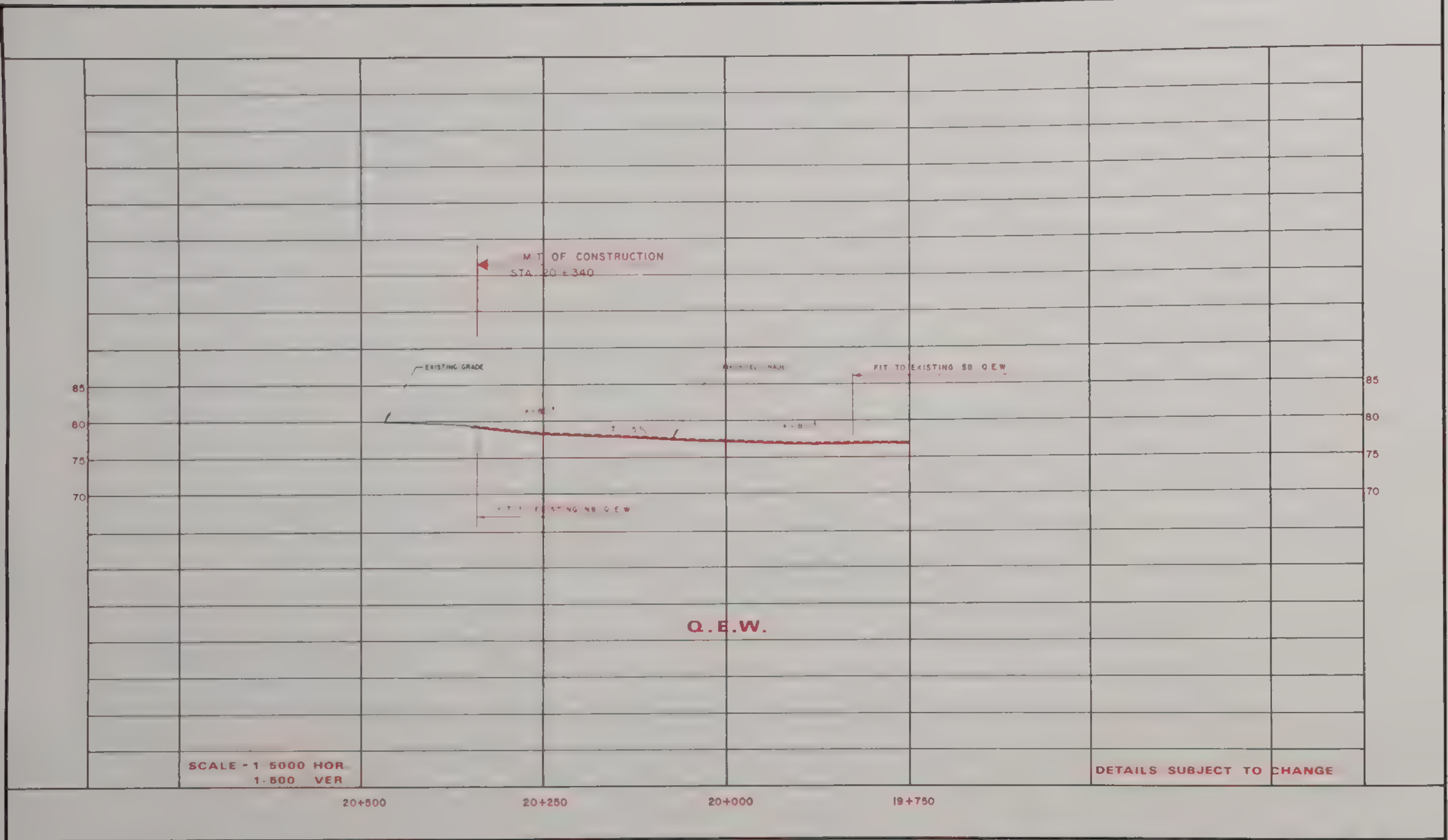
Approved by P. W. C.
Date June 18/81

Regionally yours,

RECEIVED
AUG 11 1981
ADMIN SERVICES
CENTRAL REGION

APPENDIX I – 1:5,000 Plan and Profile Plates

STAGE 2



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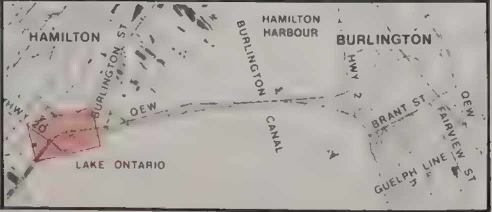
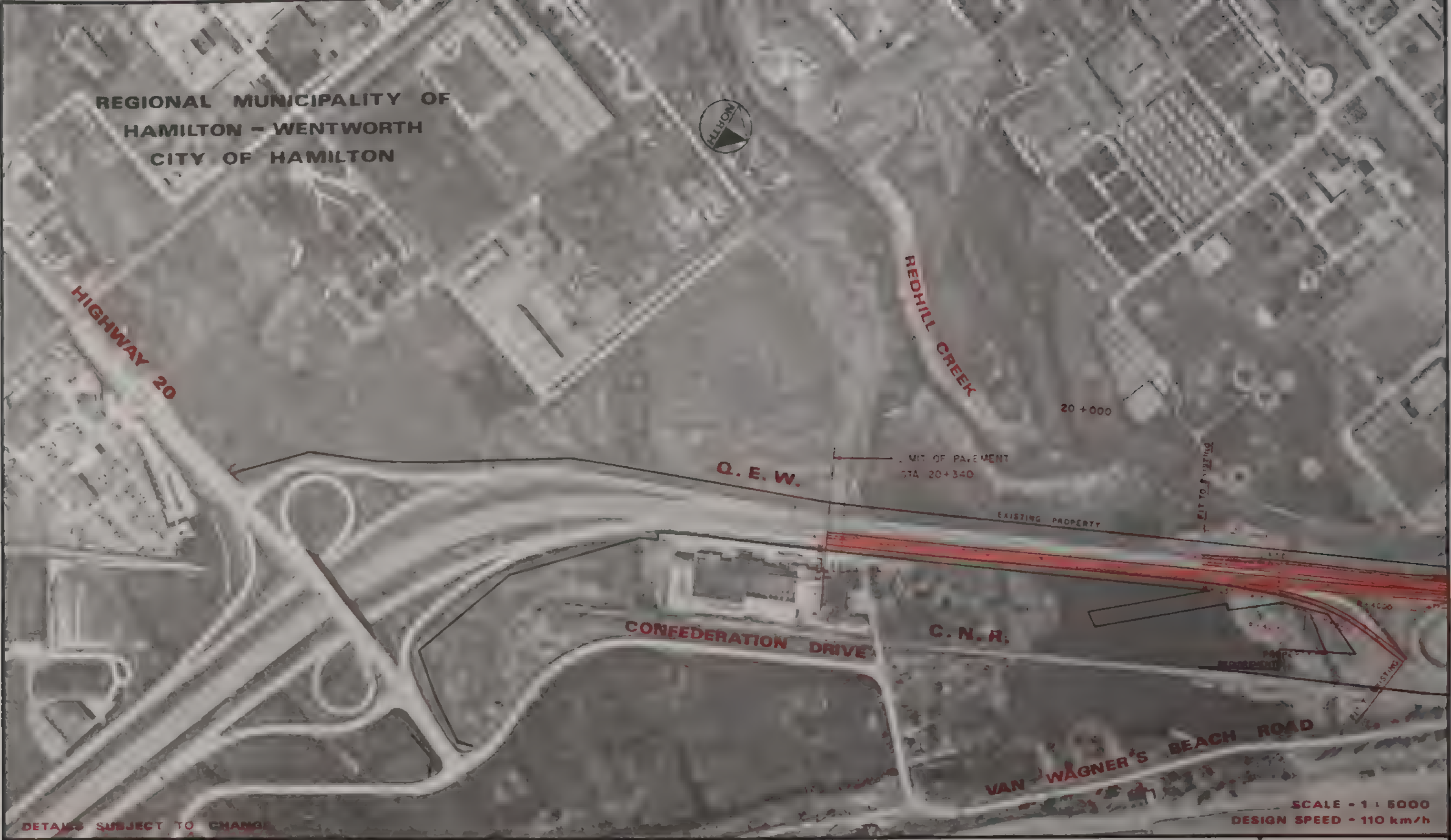
STAGE 2

QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON





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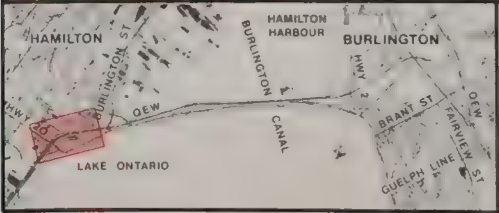

QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

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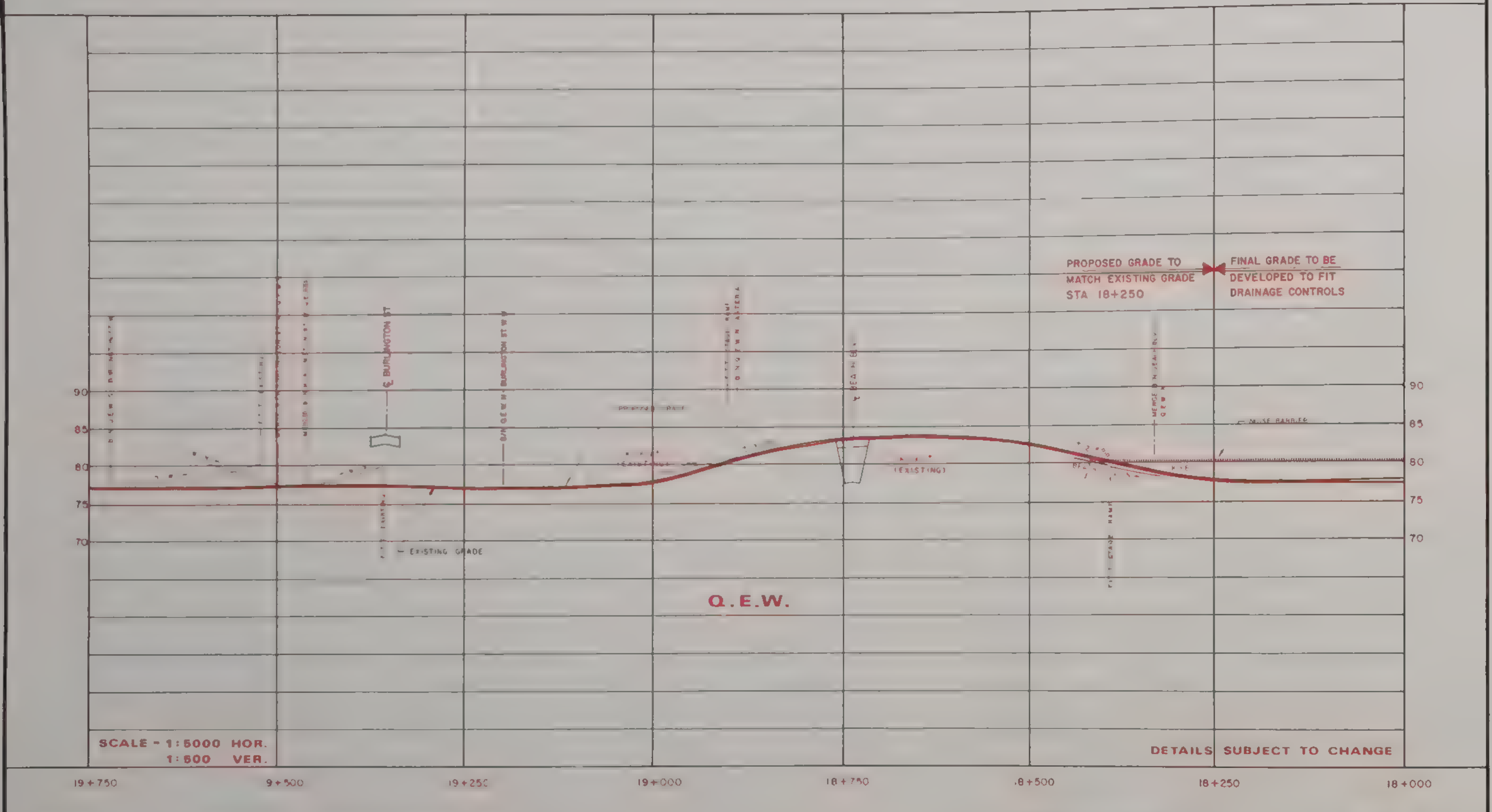
STAGE 2



PROPOSED GRADE TO MATCH EXISTING GRADE STA 18+250

FINAL GRADE TO BE DEVELOPED TO FIT DRAINAGE CONTROLS

SCALE - 1:5000 HOR.
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DETAILS SUBJECT TO CHANGE

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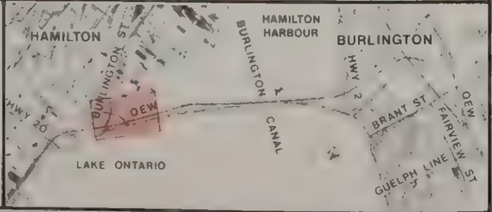
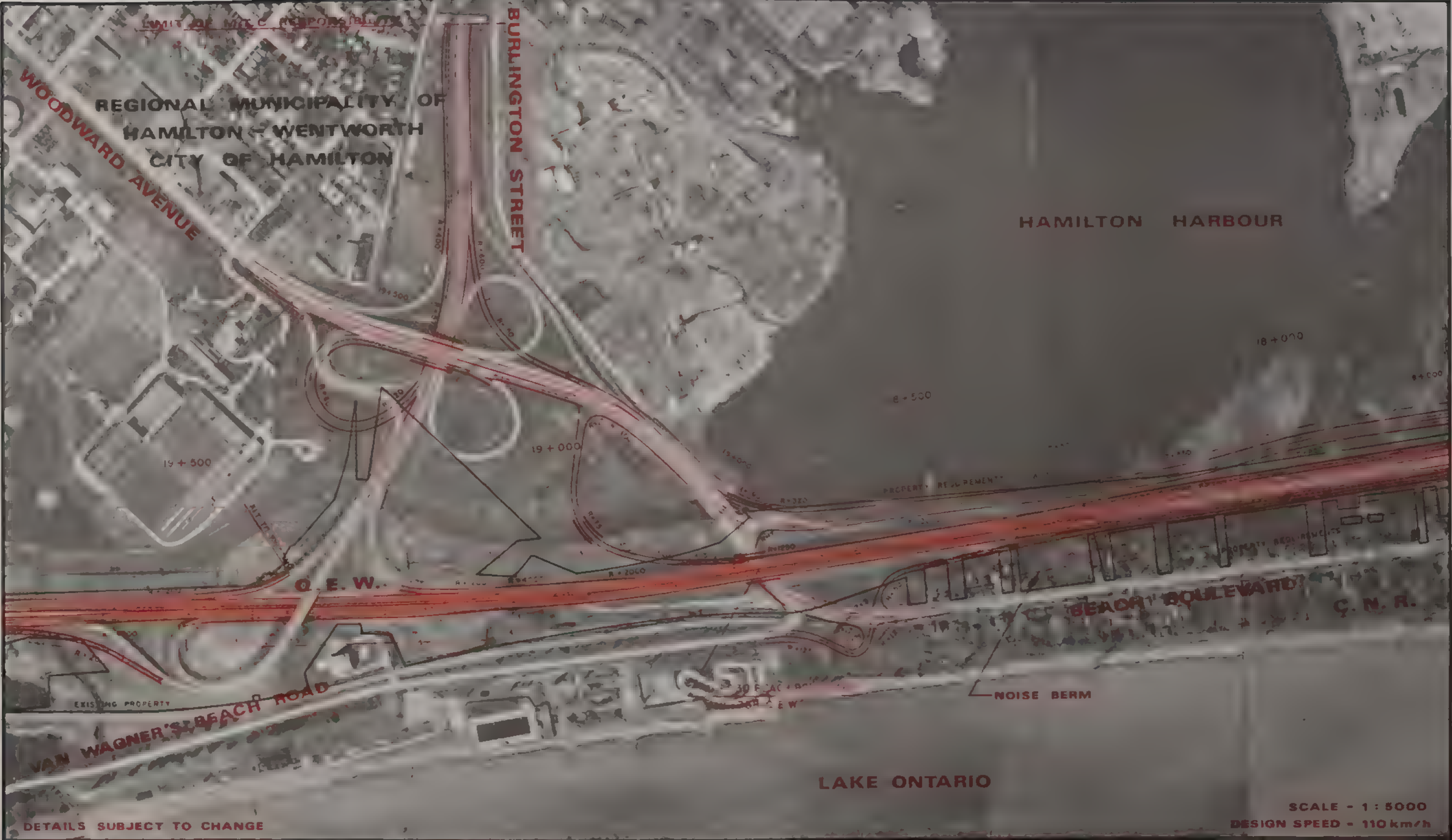
STAGE 2

QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON





QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

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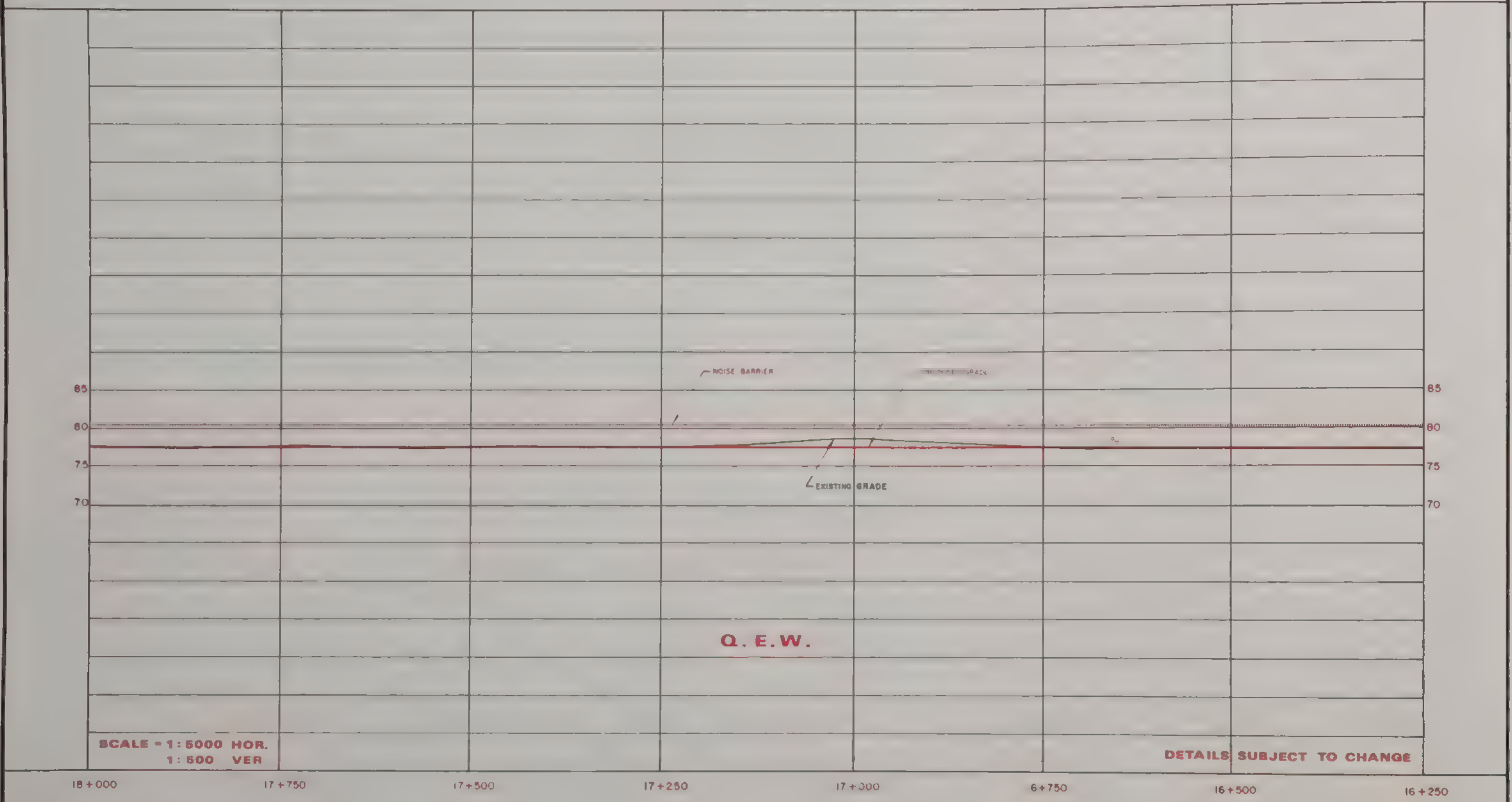
STAGE 2



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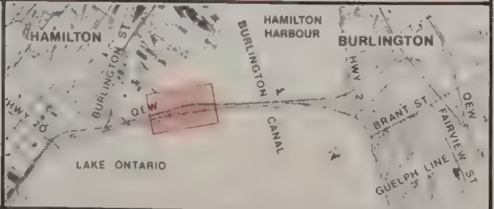
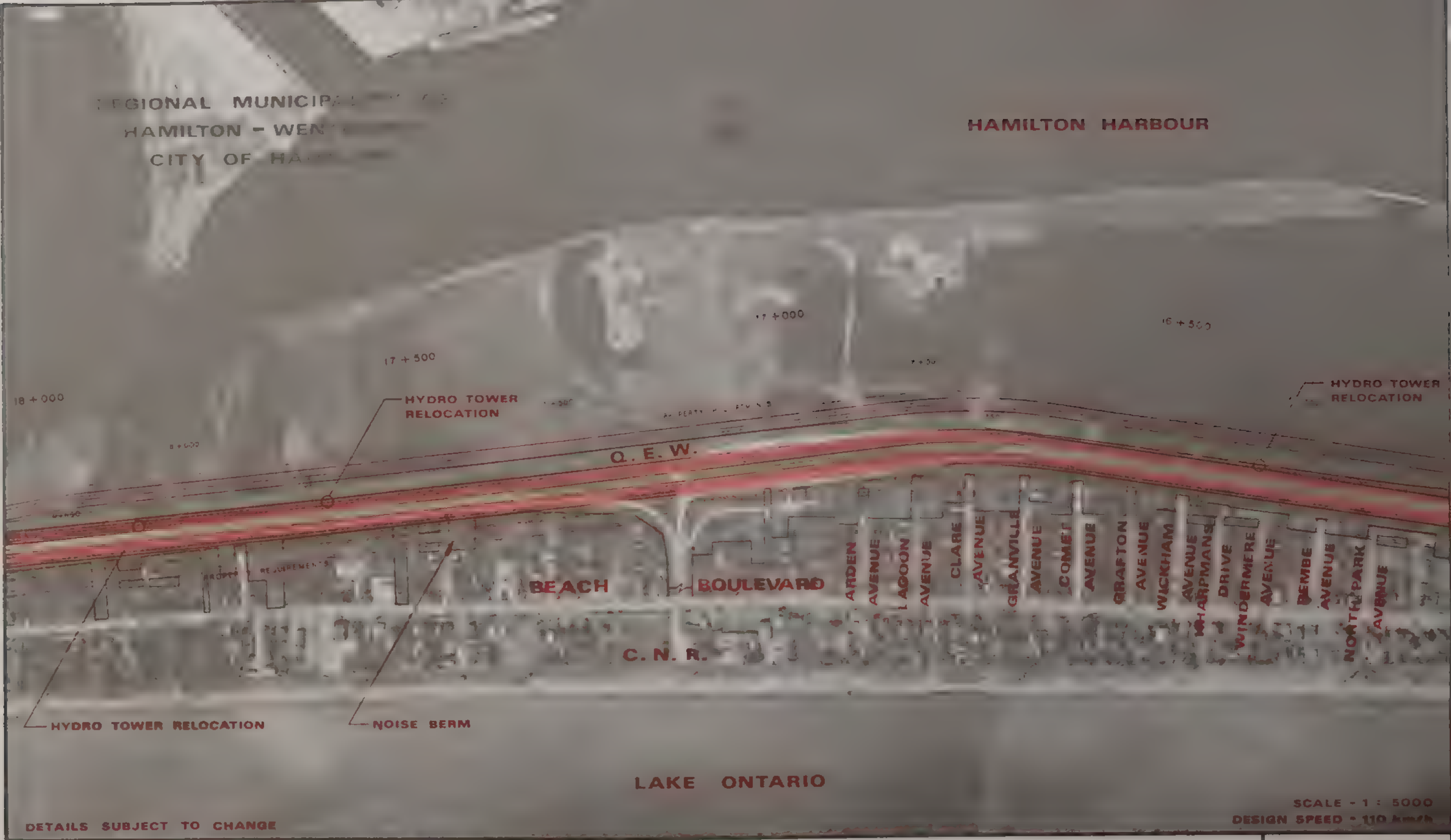
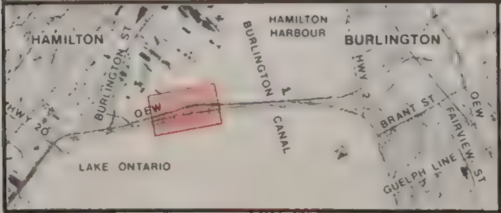
STAGE 2

QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON







QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

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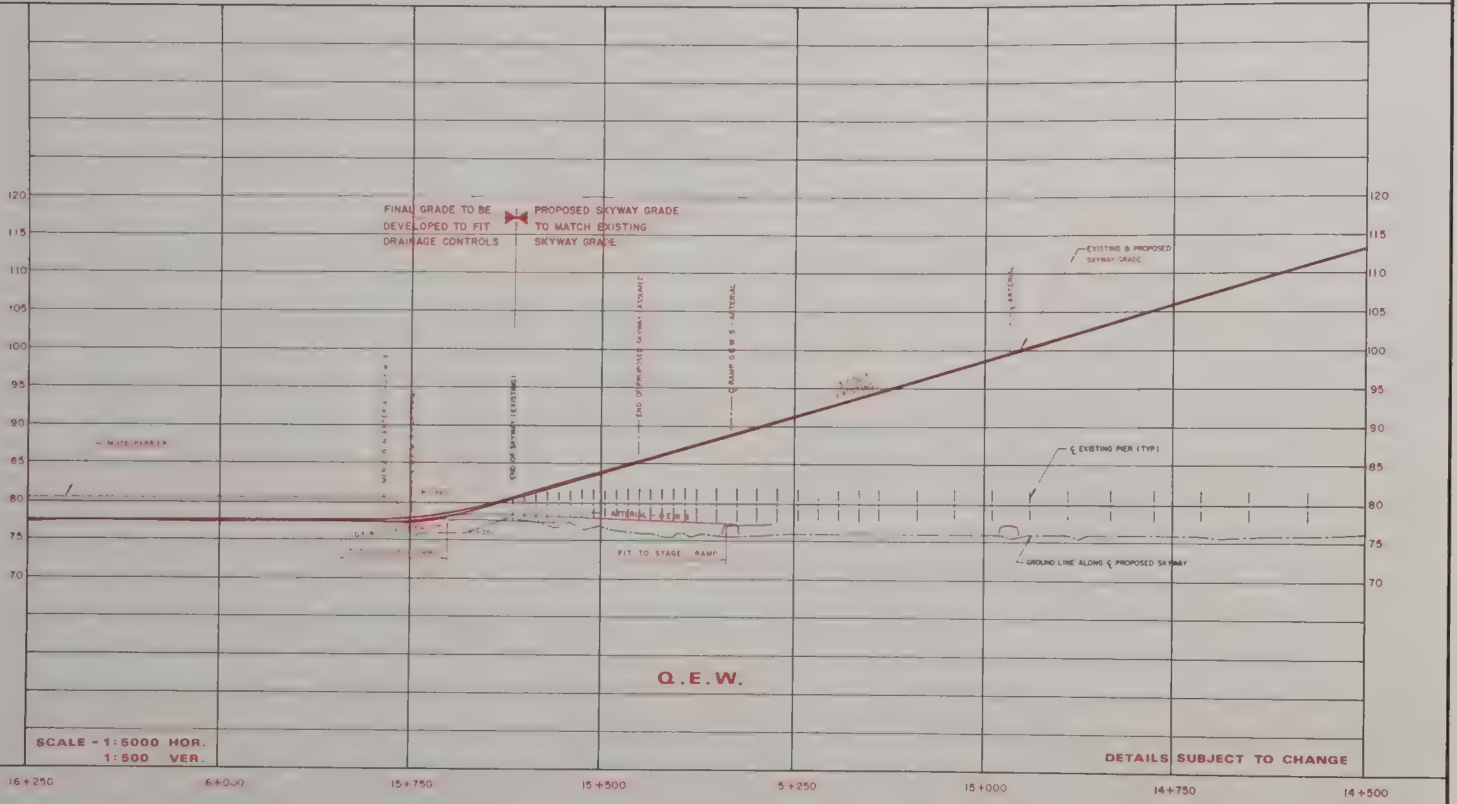
STAGE 2



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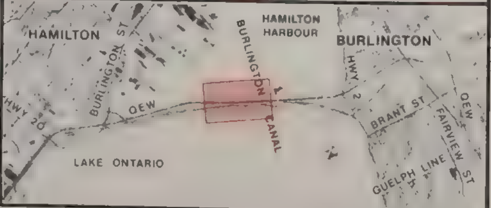
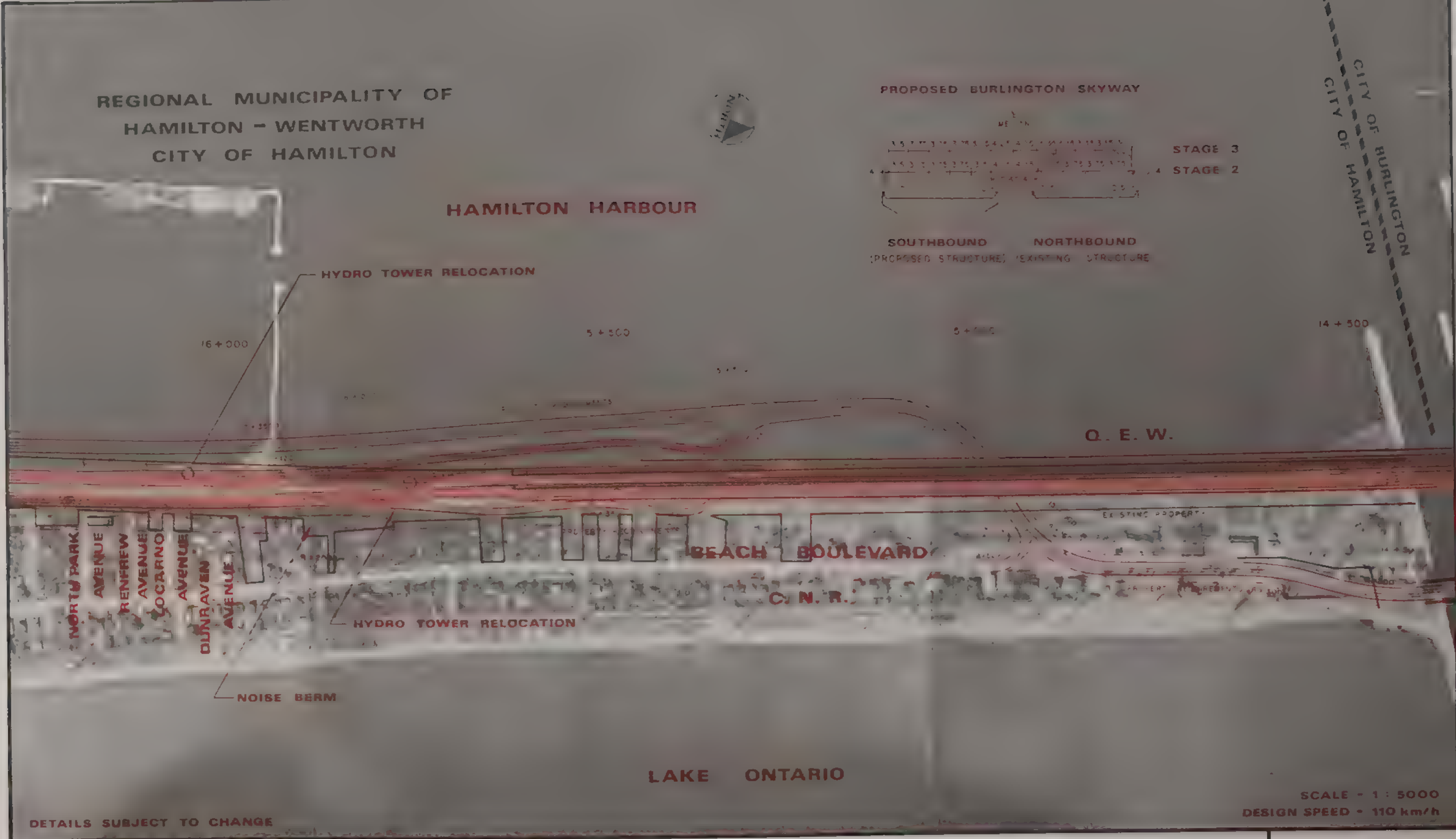
QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON





QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

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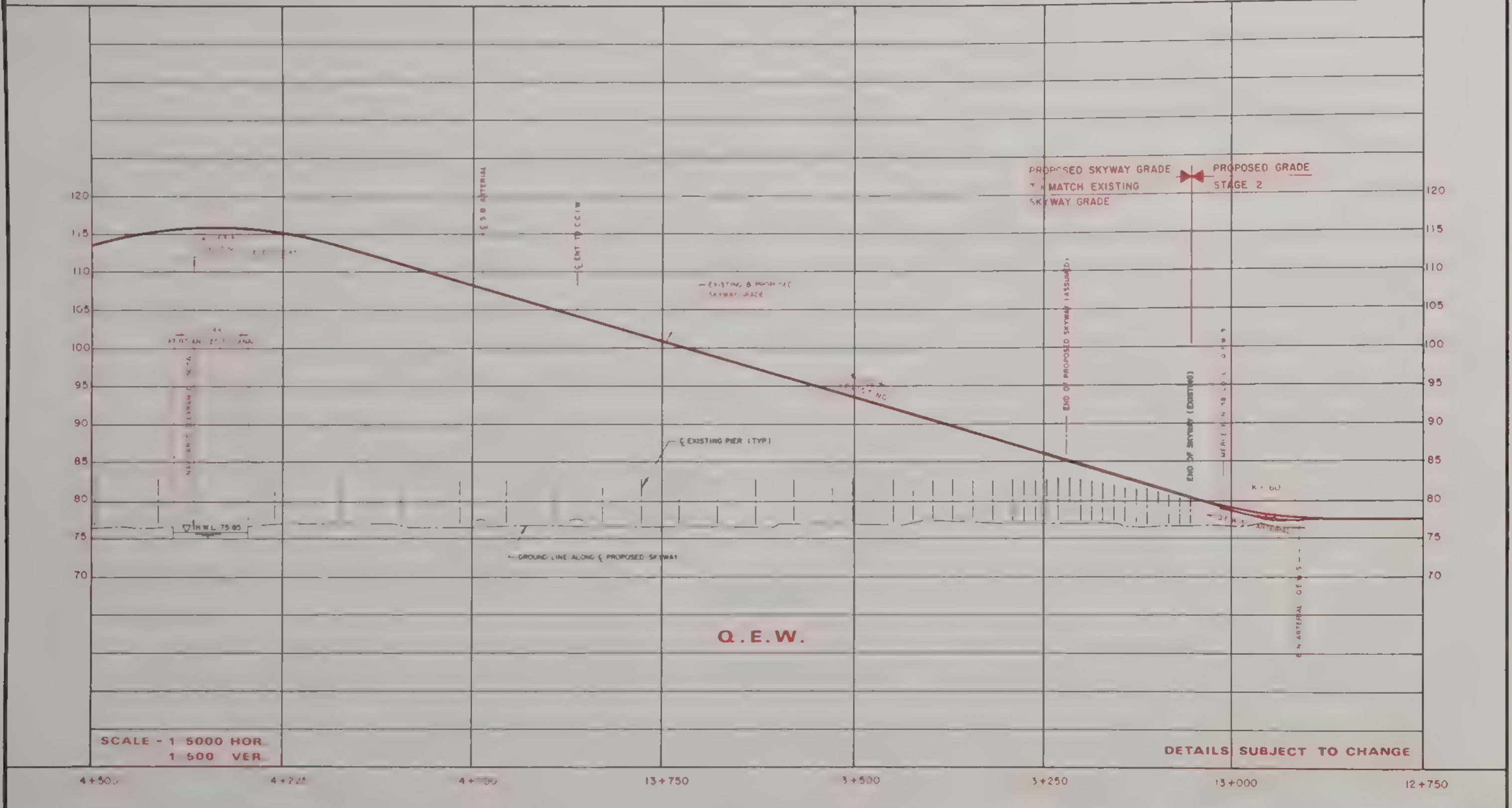
STAGE 2



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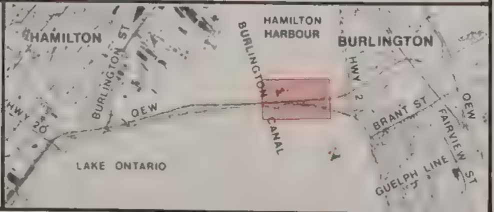
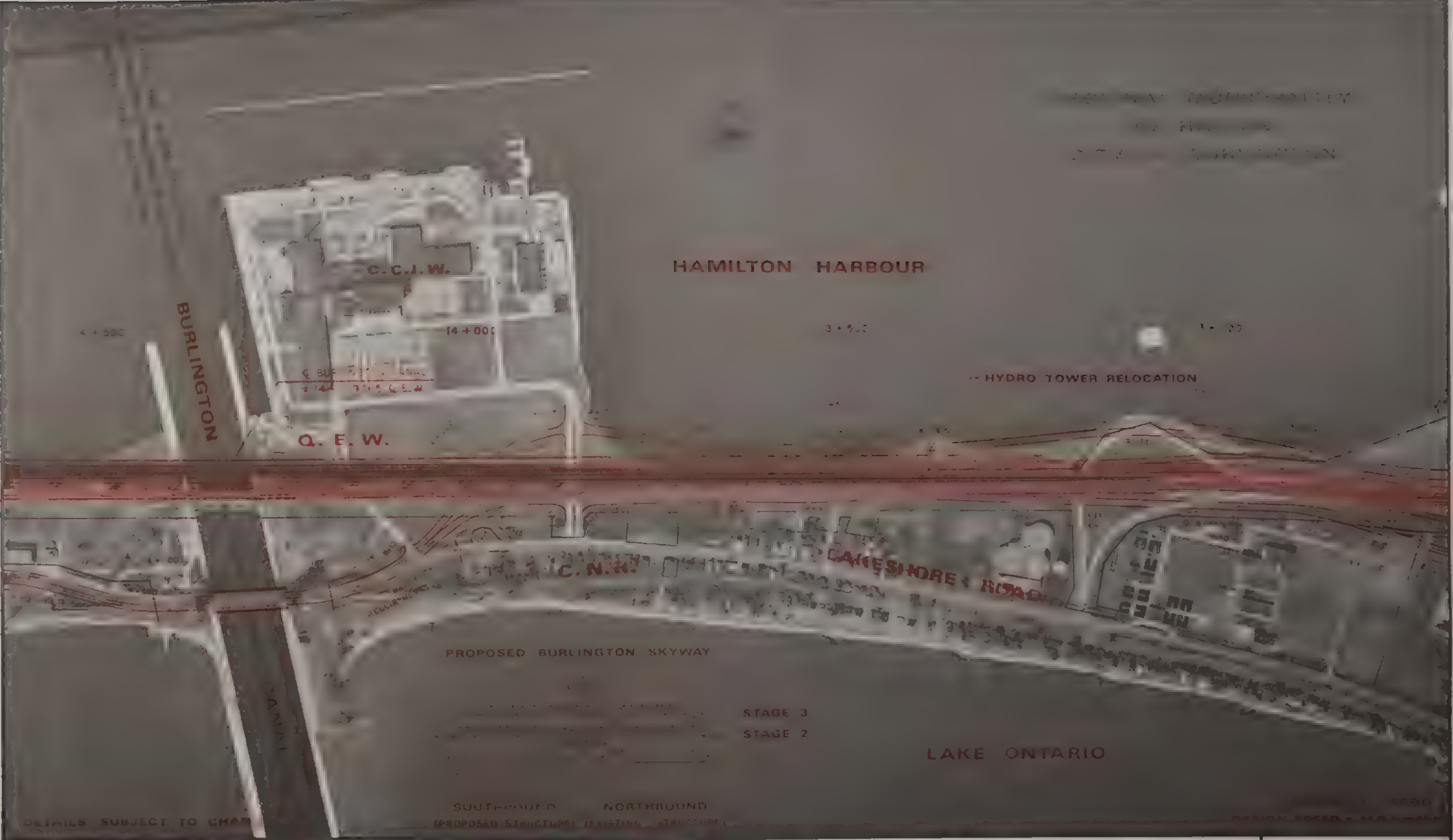
QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON





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BURLINGTON TO HAMILTON

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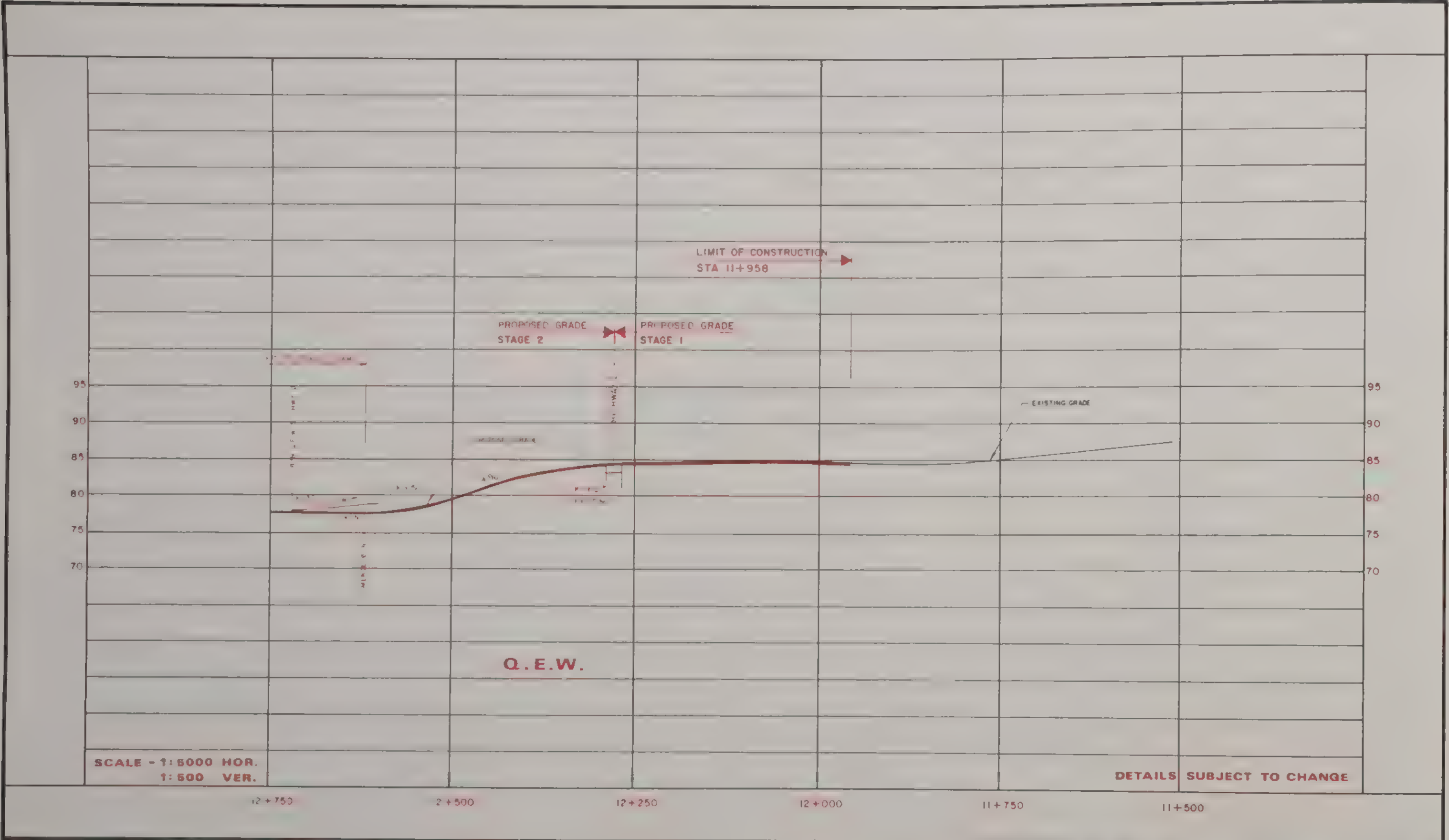

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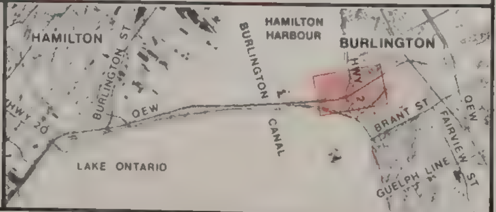
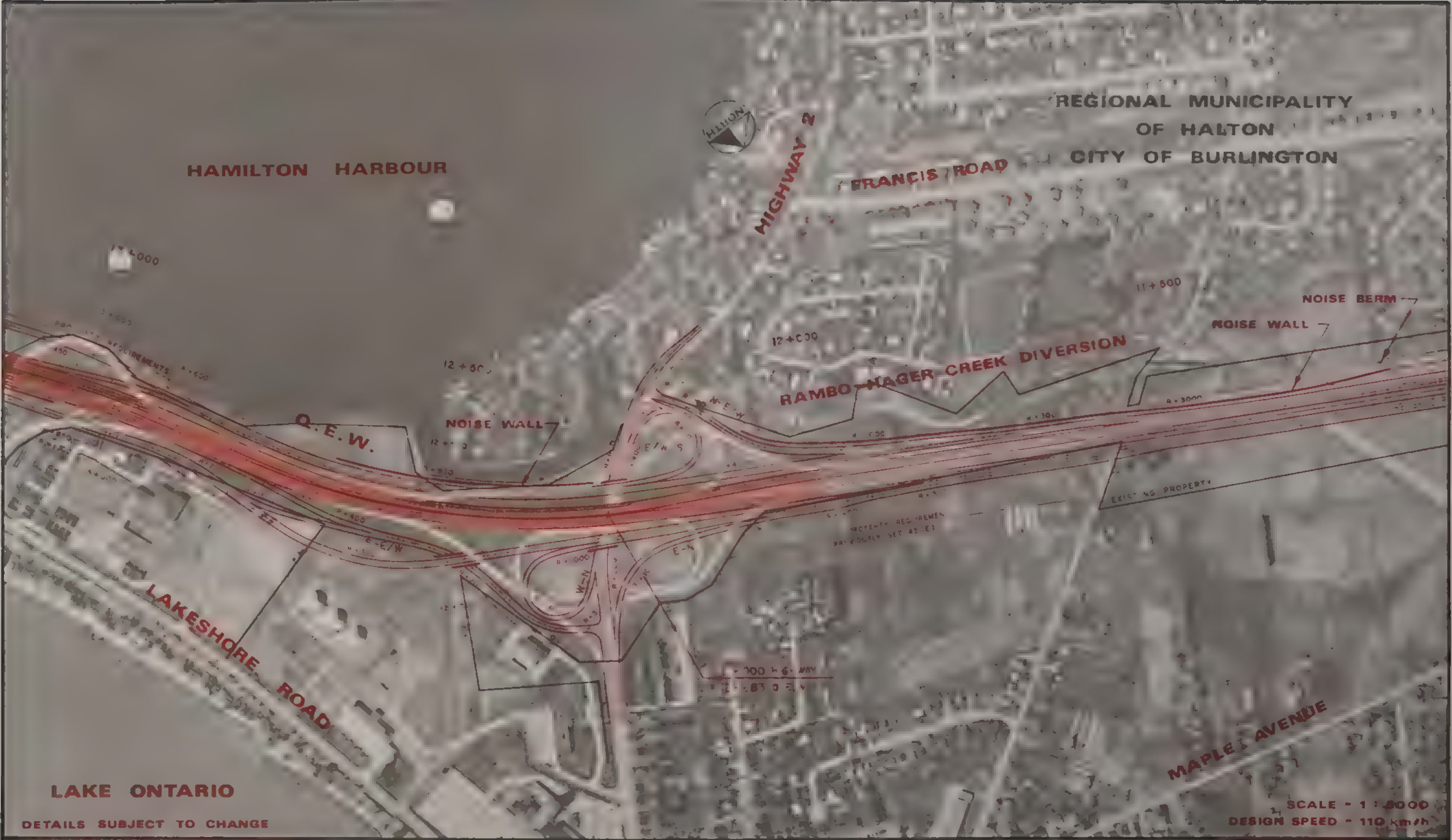
QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON





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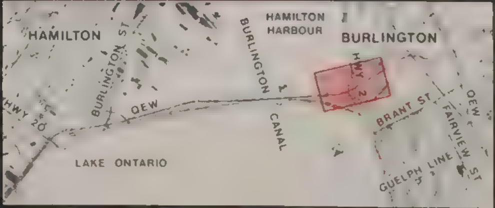

QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

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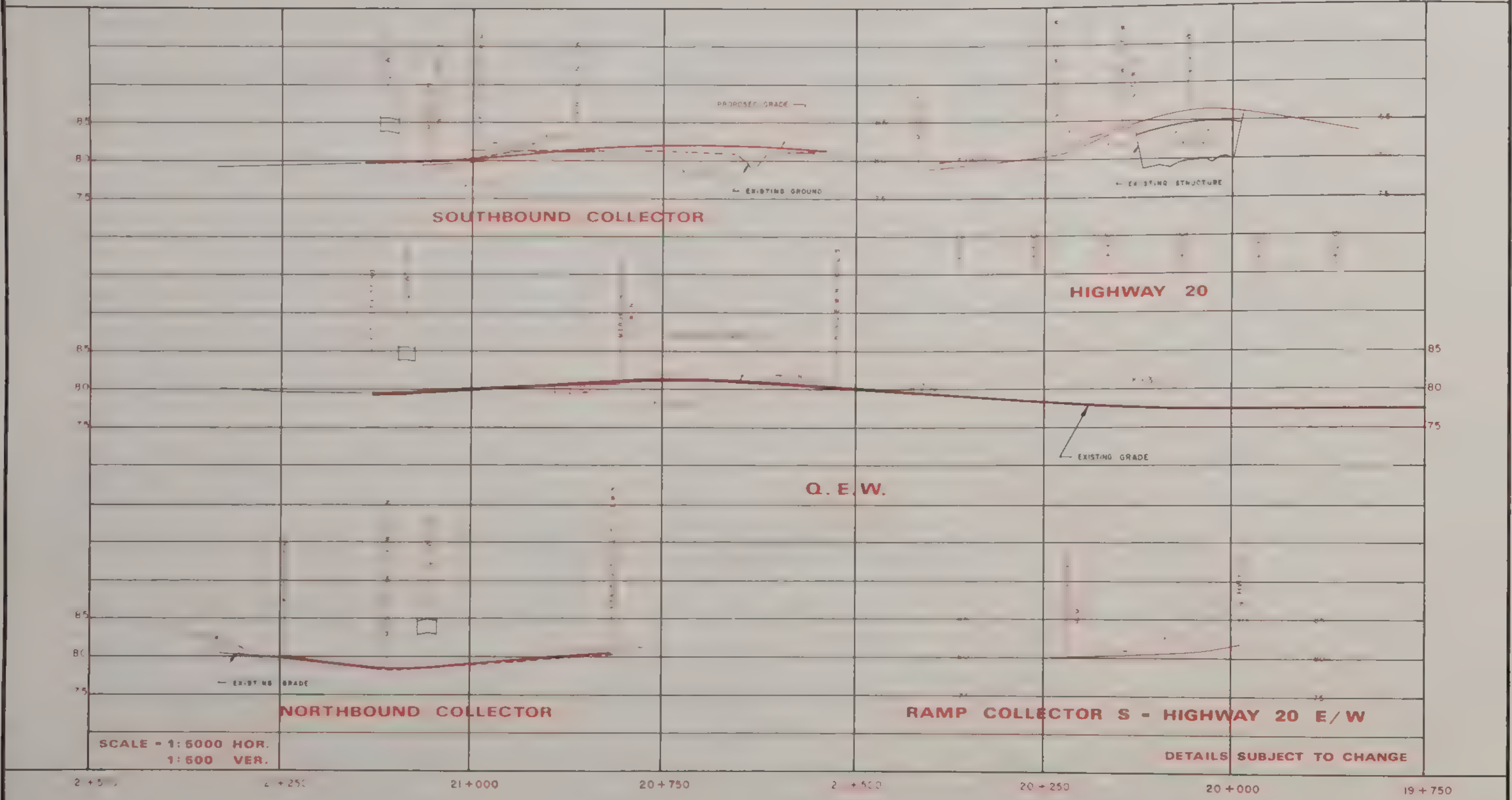
STAGE 2

STAGE 3



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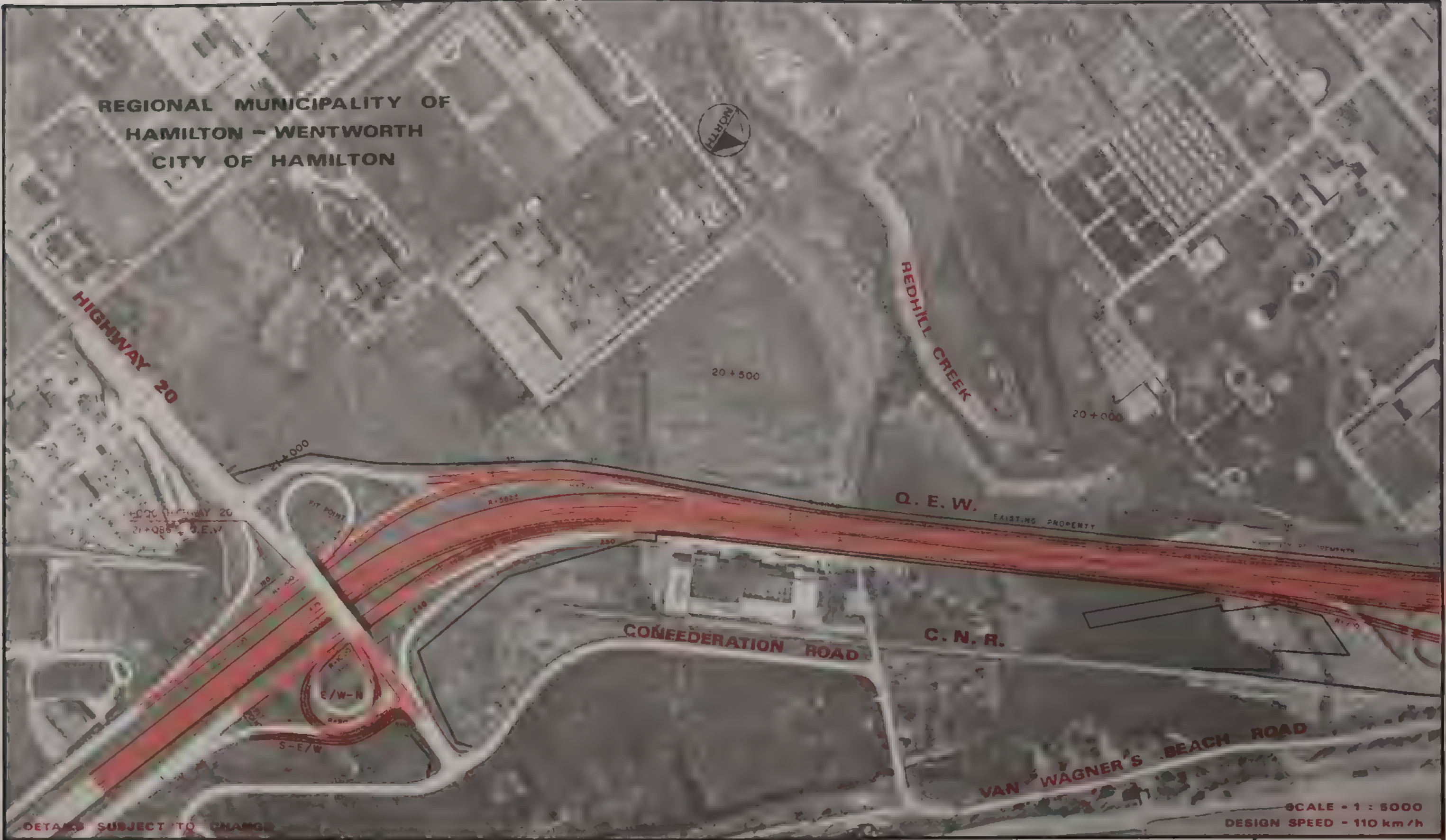
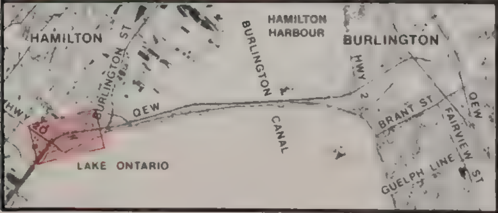
QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON





QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

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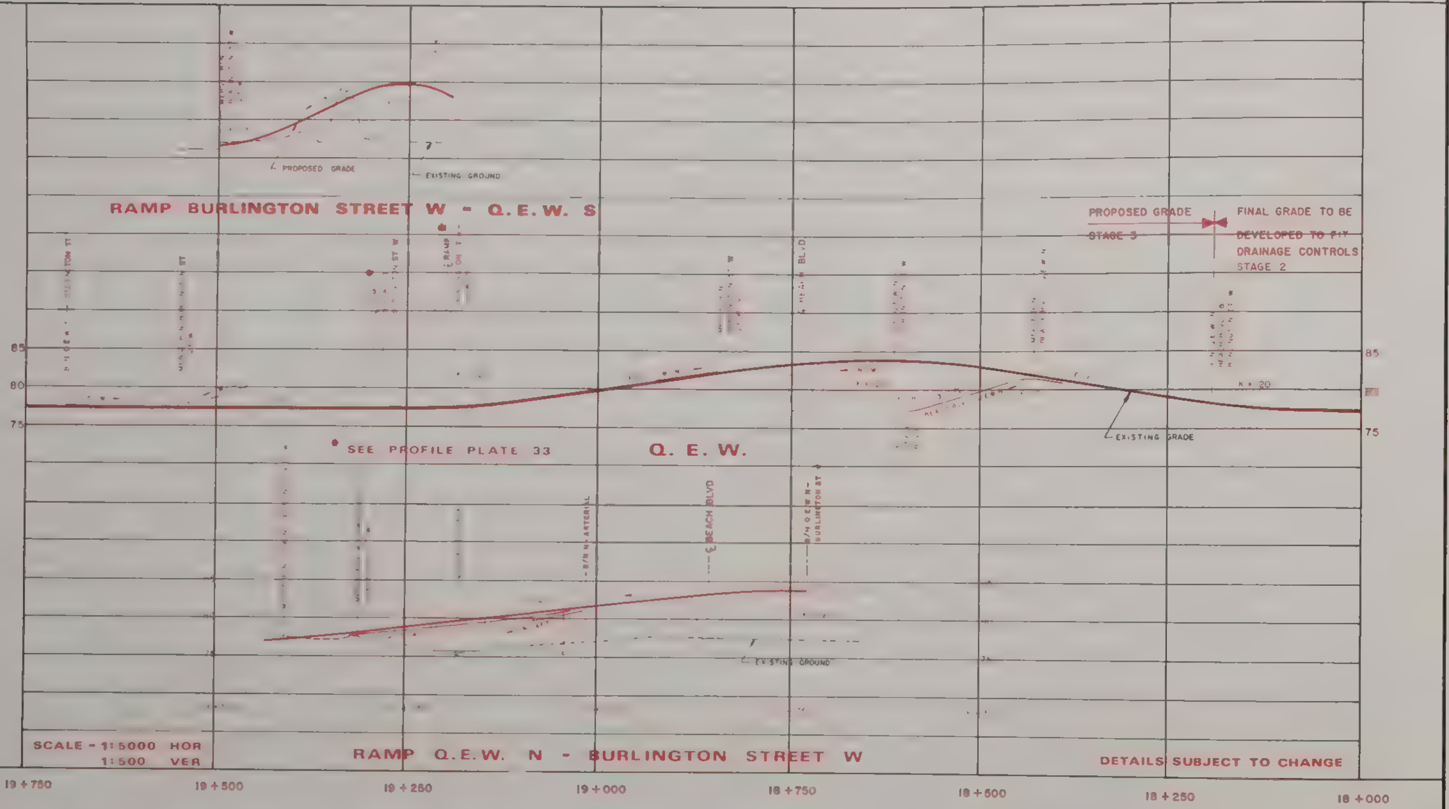
STAGE 3



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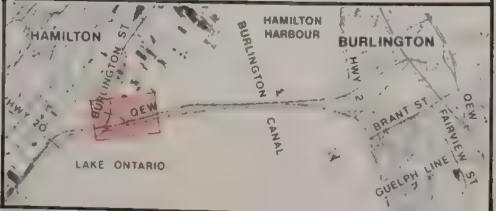
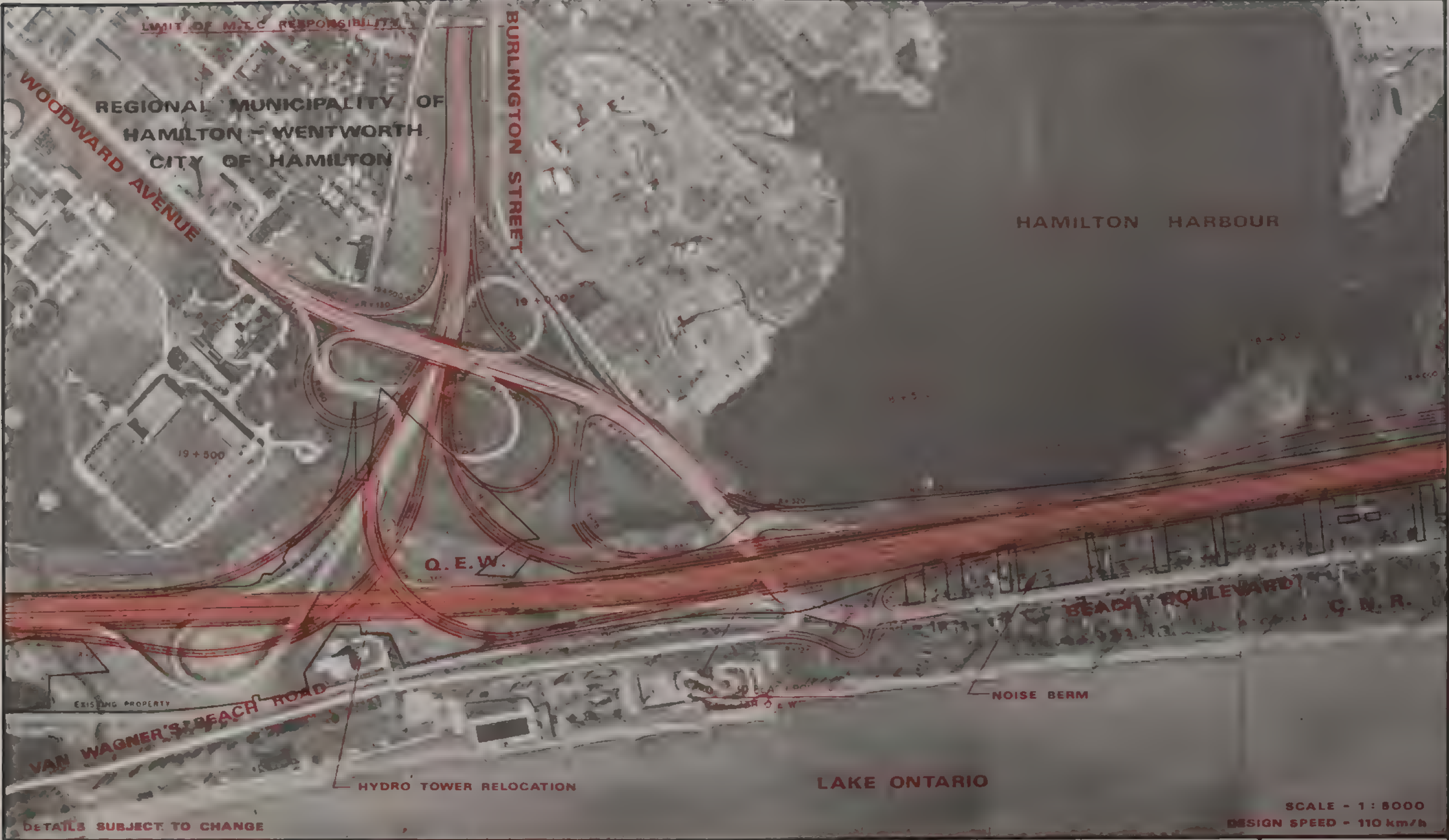
STAGE 3

QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON





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QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

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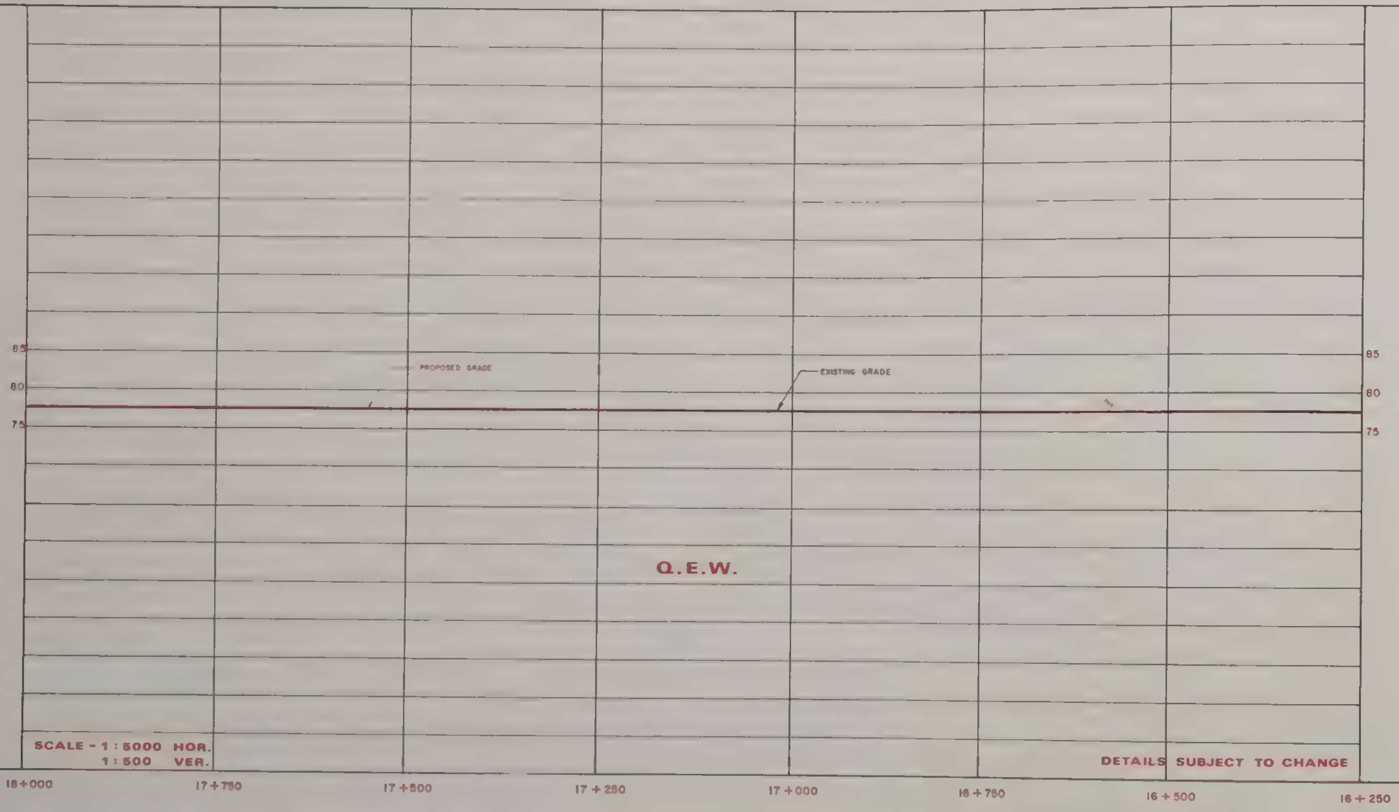
STAGE 3



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DETAILS SUBJECT TO CHANGE

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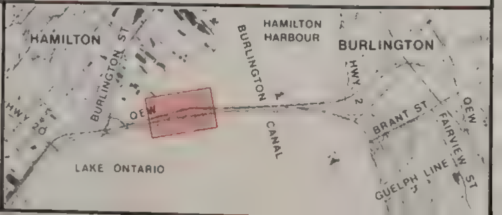
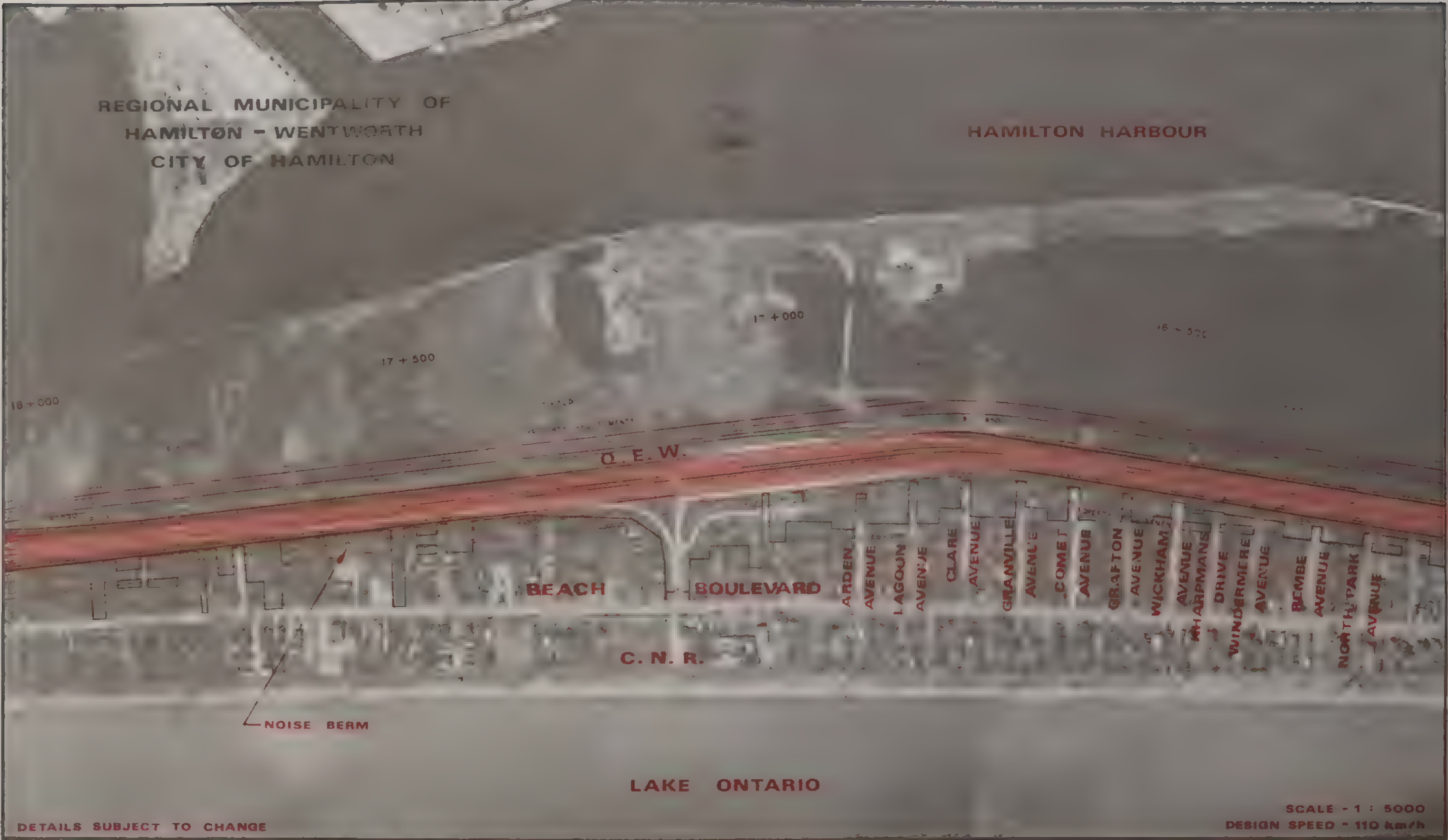
QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON





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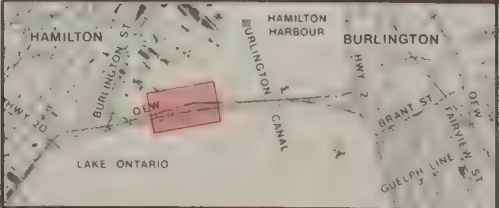

QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

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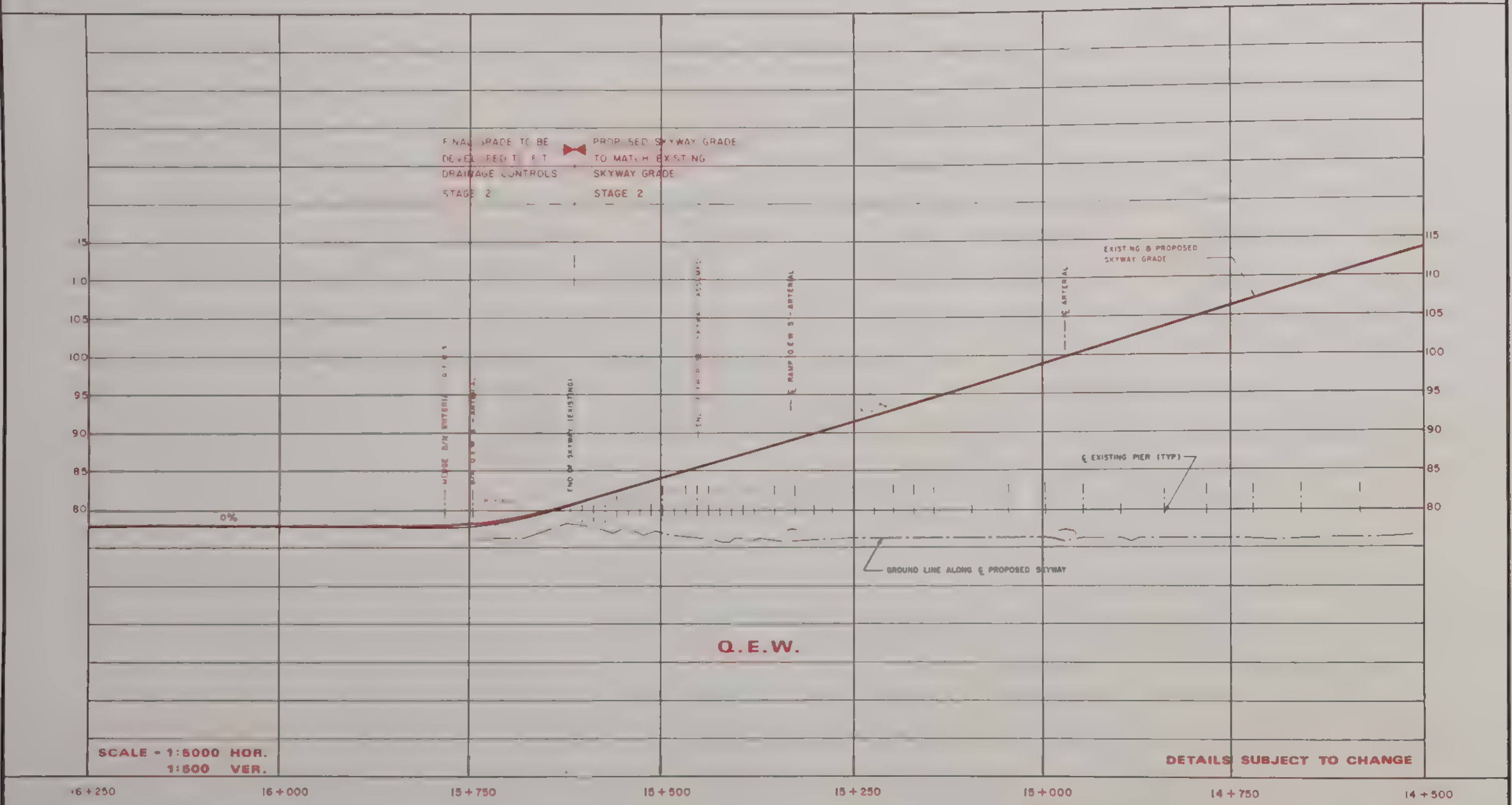
STAGE 3



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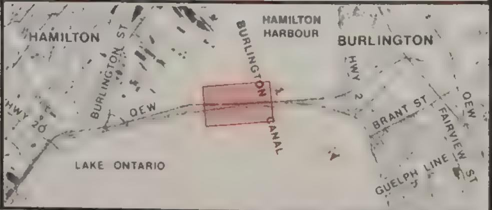
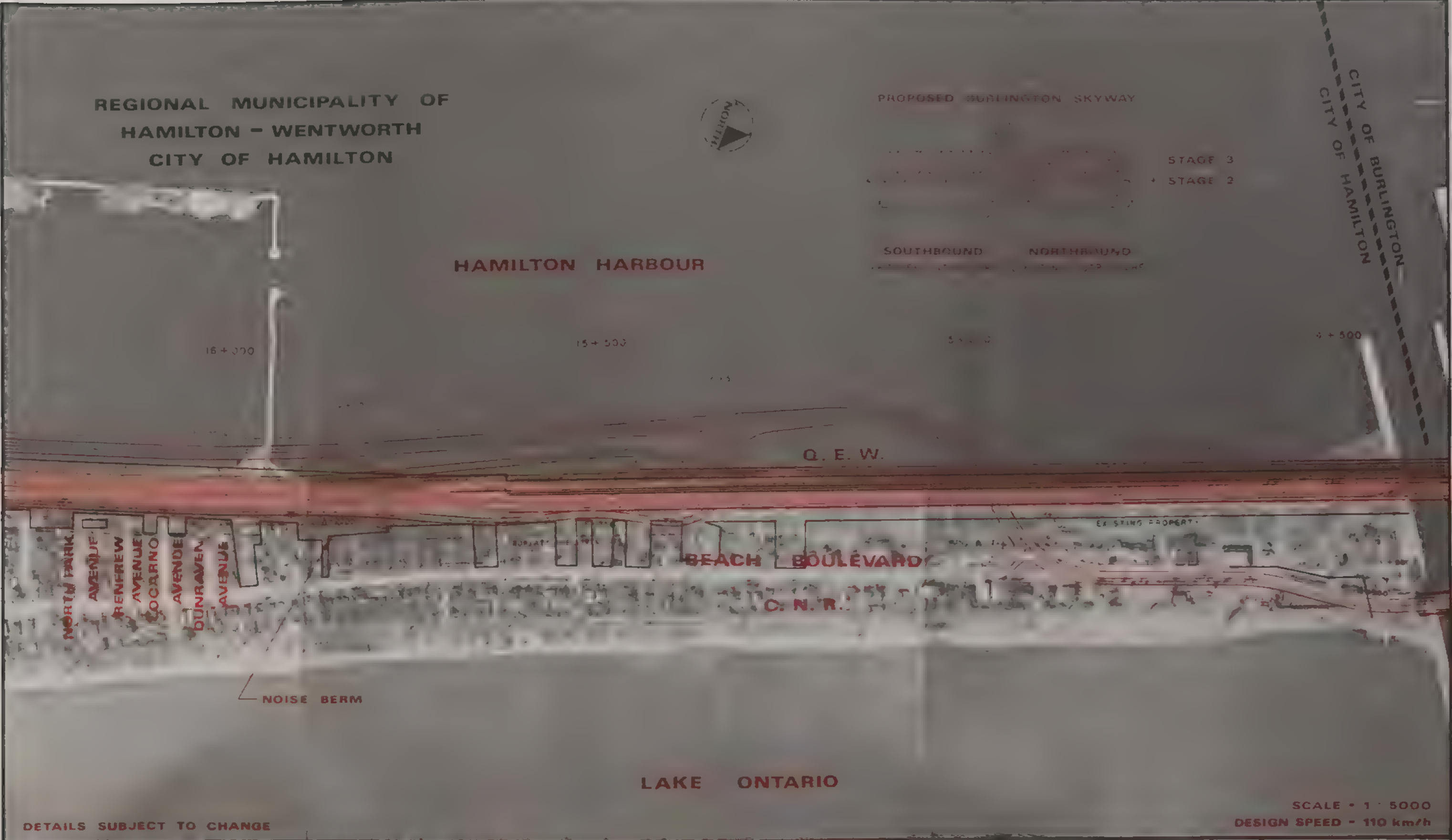
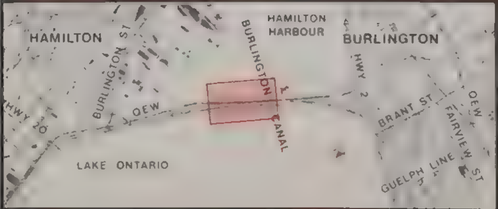
STAGE 3

QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON







QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

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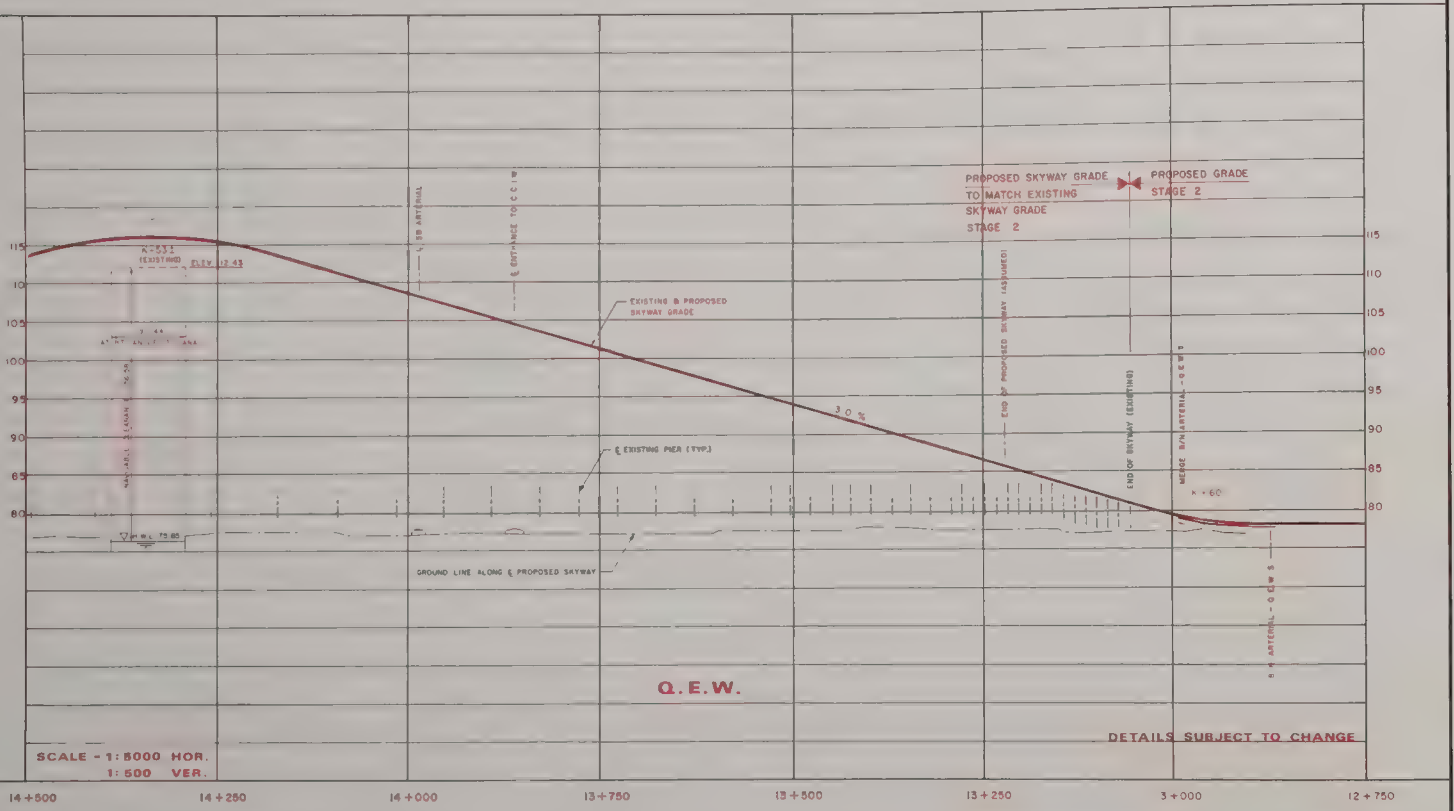
STAGE 3



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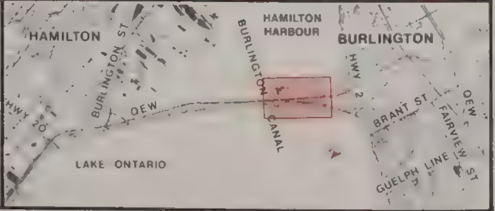
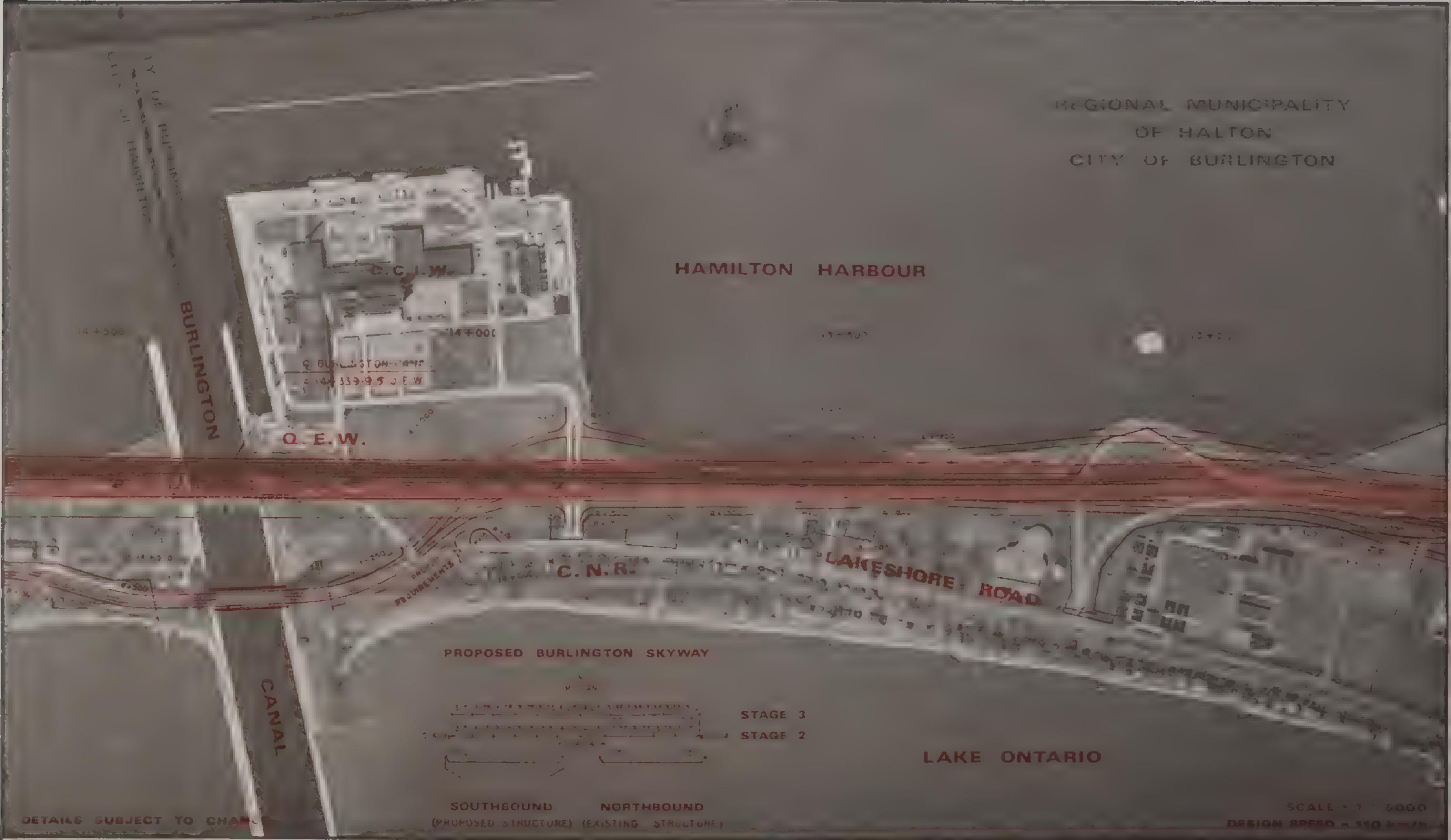
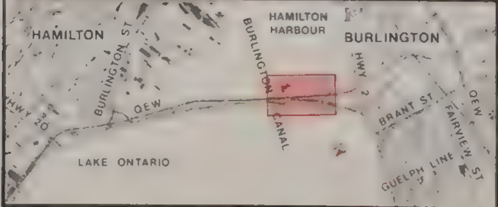
STAGE 3

QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON







QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

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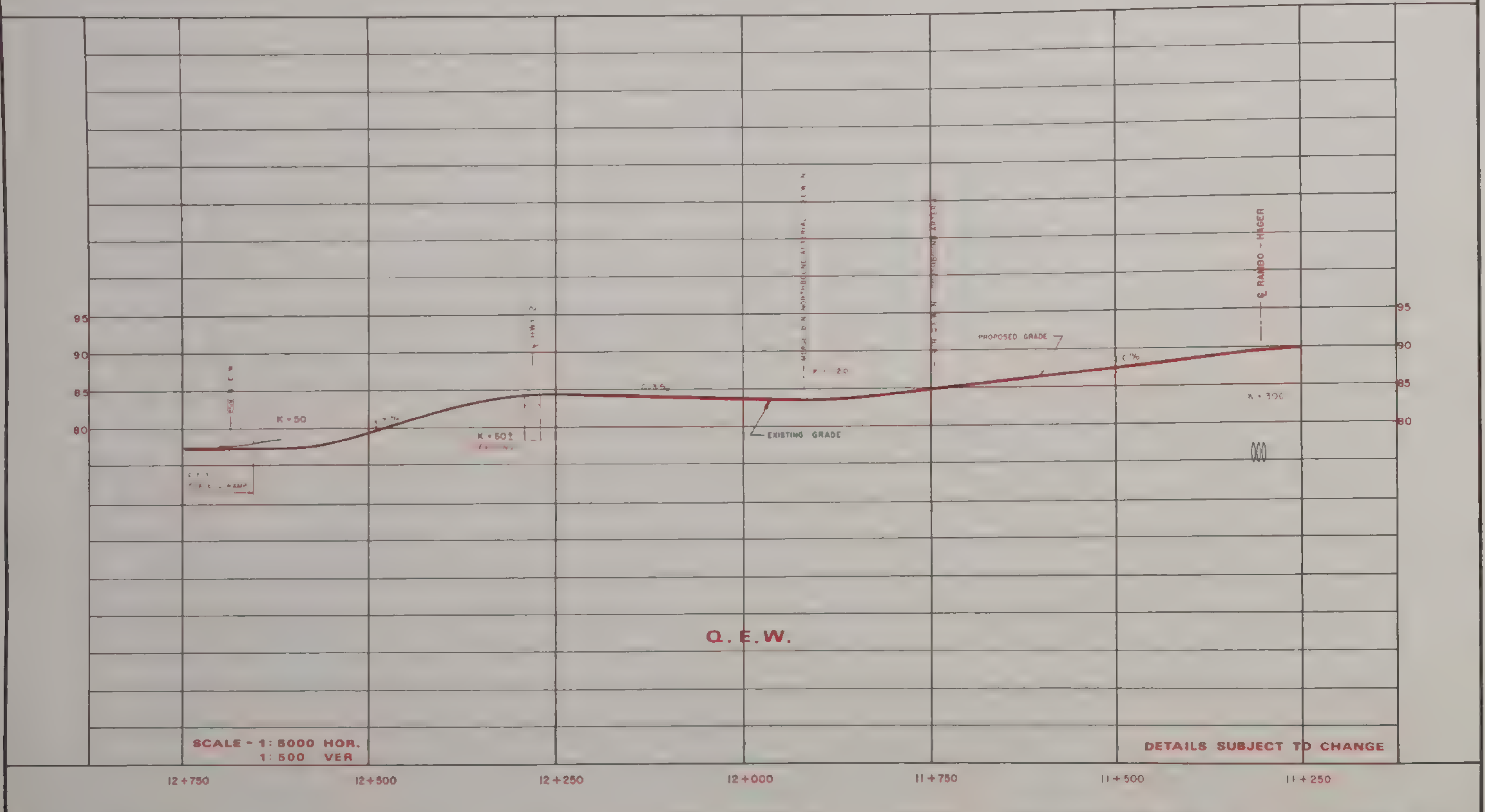
STAGE 3



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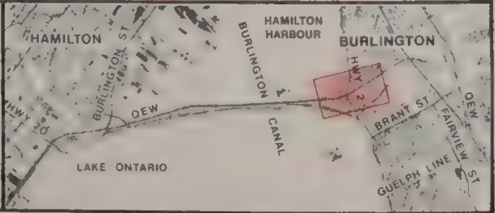
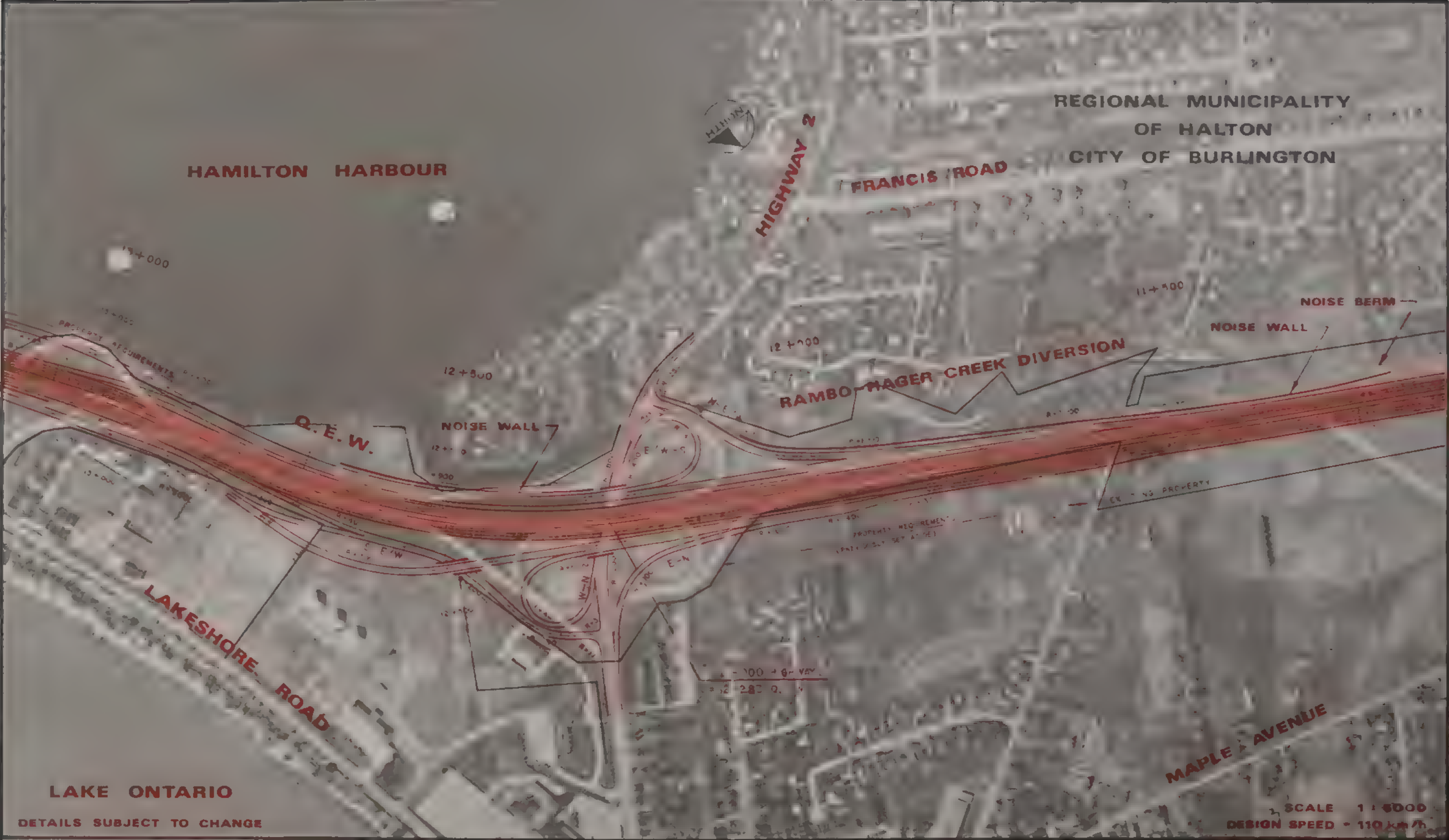
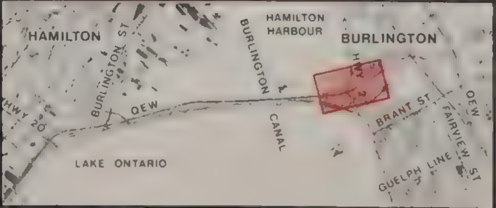
STAGE 3

QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON





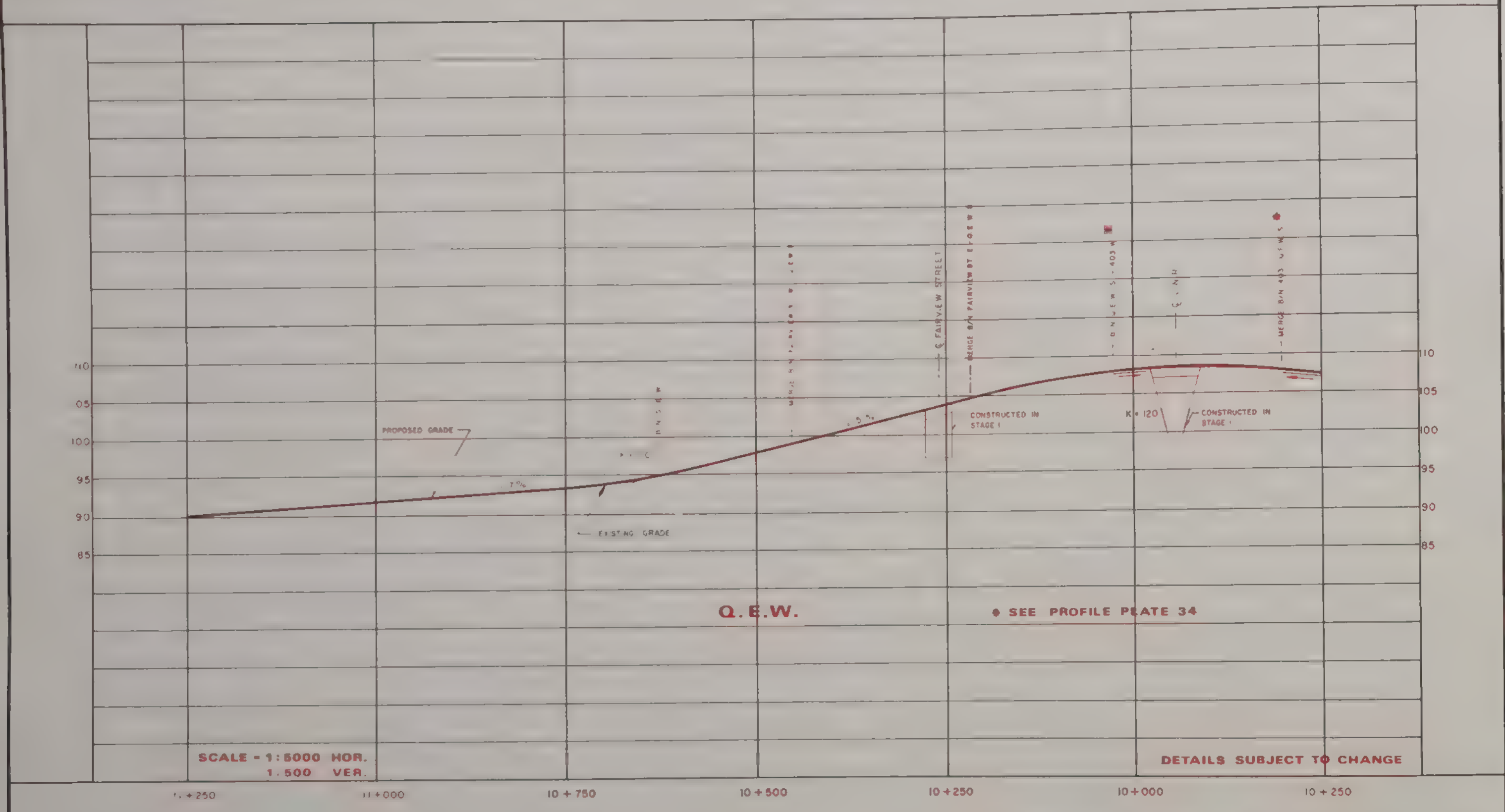


QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

24

STAGE 3

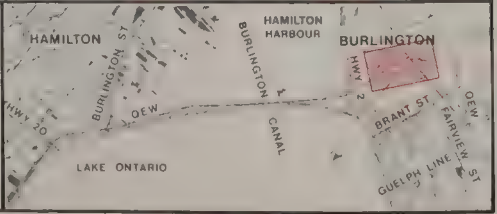


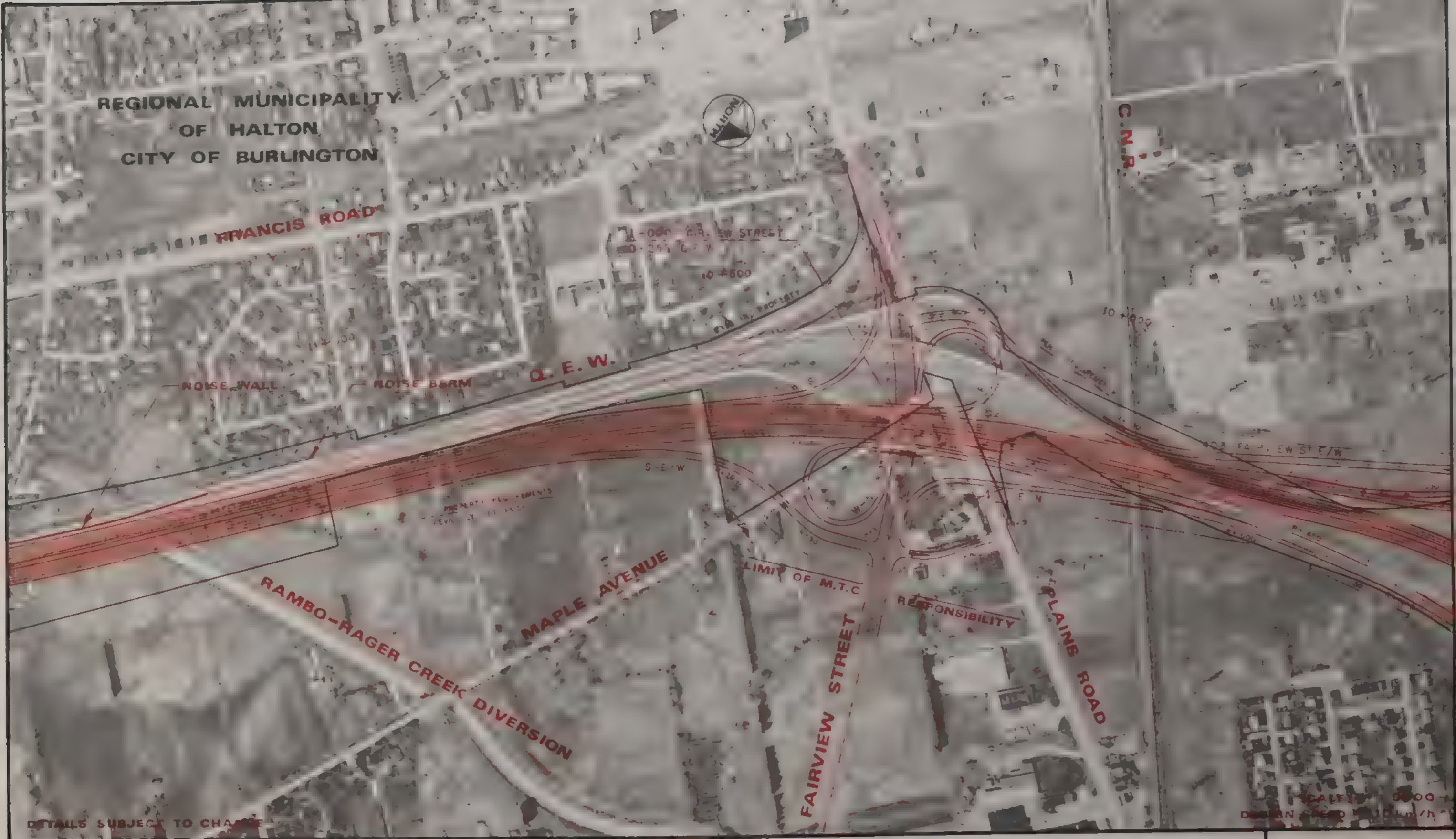
25

STAGE 3

QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON



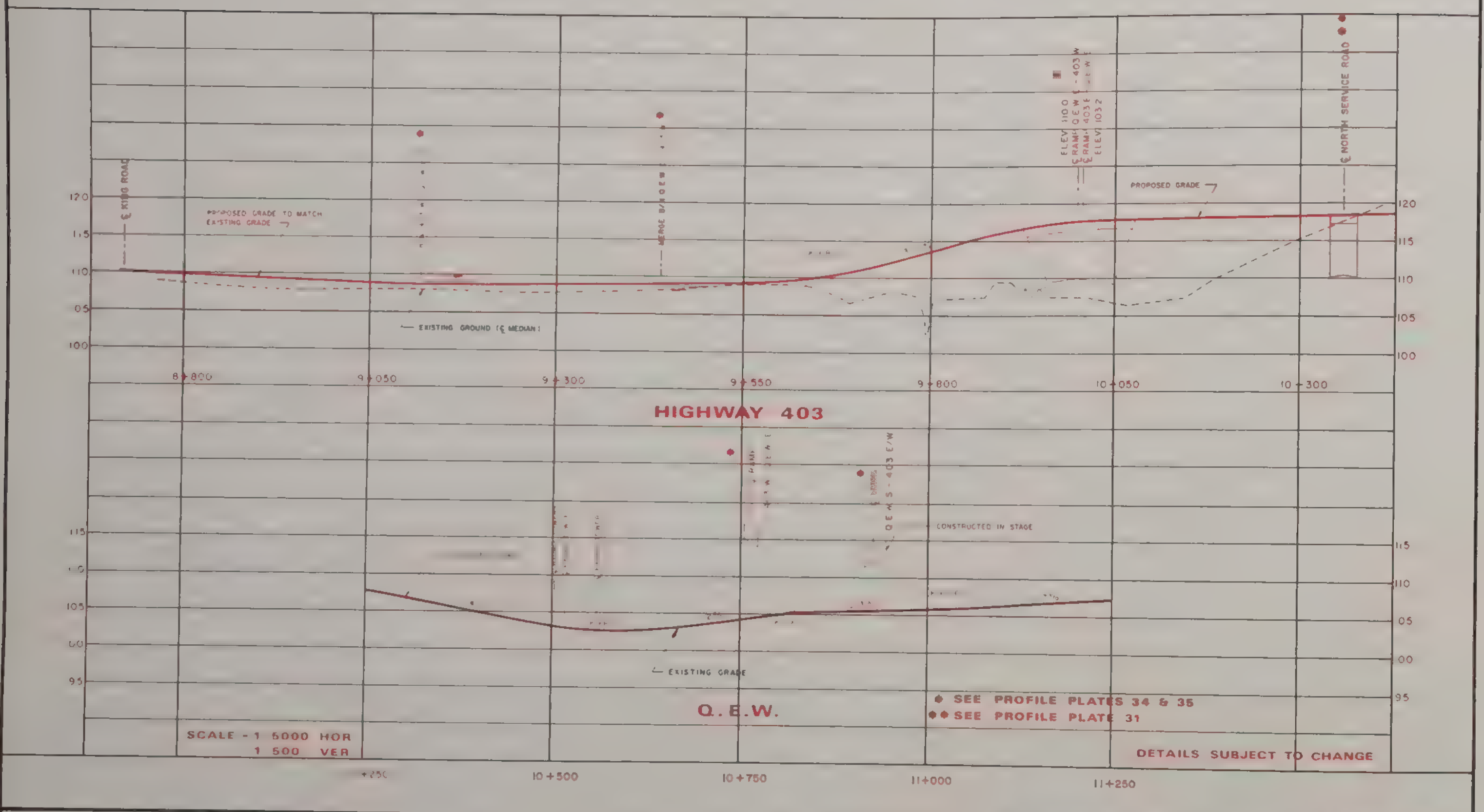


QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

26

STAGE 3



● SEE PROFILE PLATES 34 & 35

●● SEE PROFILE PLATE 31

SCALE - 1 5000 HOR
1 500 VER

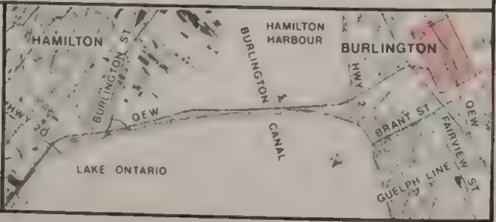
DETAILS SUBJECT TO CHANGE

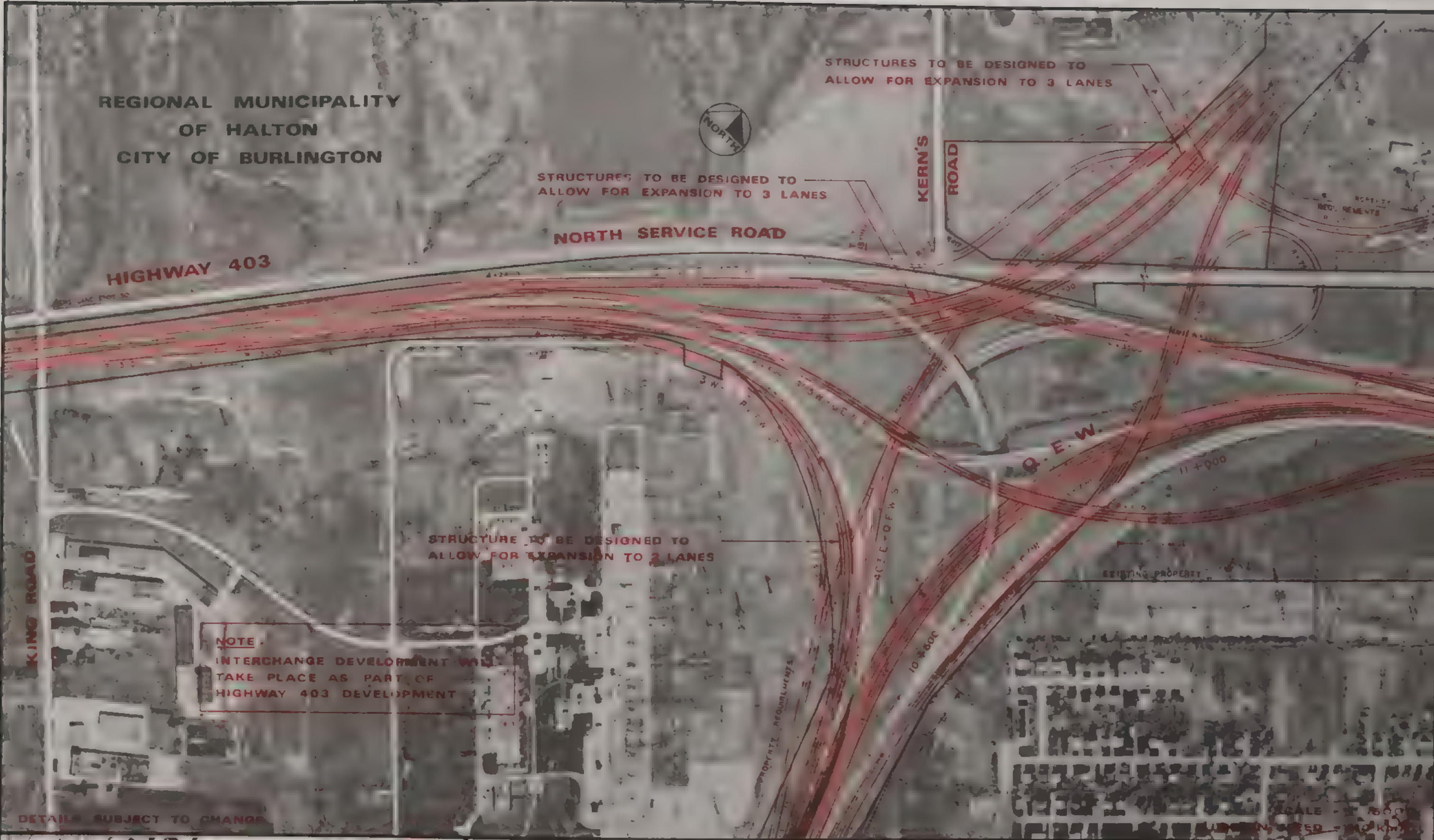
27

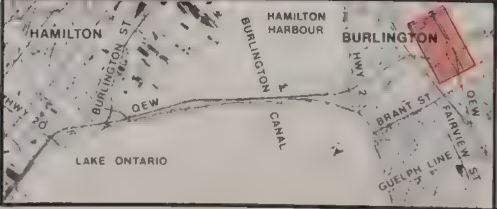
STAGE 3

QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON




REGIONAL MUNICIPALITY
OF HALTON
CITY OF BURLINGTON
NORTH
STRUCTURES TO BE DESIGNED TO
ALLOW FOR EXPANSION TO 3 LANES
STRUCTURES TO BE DESIGNED TO
ALLOW FOR EXPANSION TO 3 LANES
KERN'S ROAD
NORTH SERVICE ROAD
HIGHWAY 403
Q.E.W.
11+900
STRUCTURE TO BE DESIGNED TO
ALLOW FOR EXPANSION TO 2 LANES
EXISTING PROPERTY
PROPERTY REQUIREMENTS
KING ROAD
NOTE
INTERCHANGE DEVELOPMENT WILL
TAKE PLACE AS PART OF
HIGHWAY 403 DEVELOPMENT
DETAILS SUBJECT TO CHANGE
SCALE

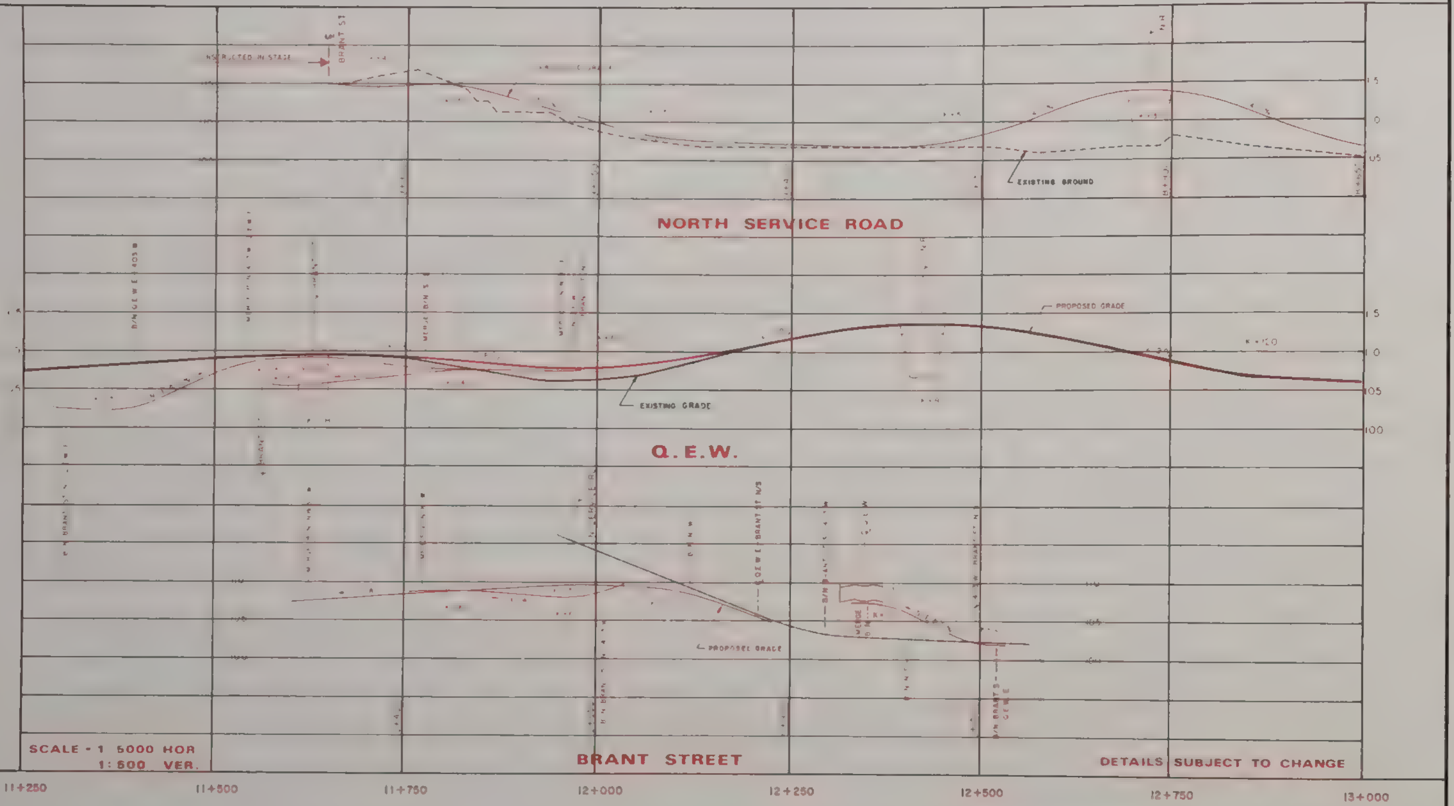


QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

28

STAGE 3

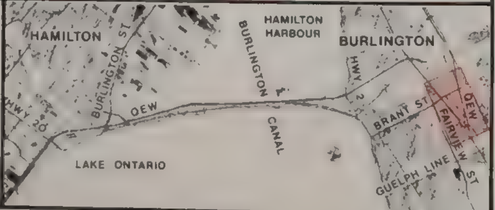


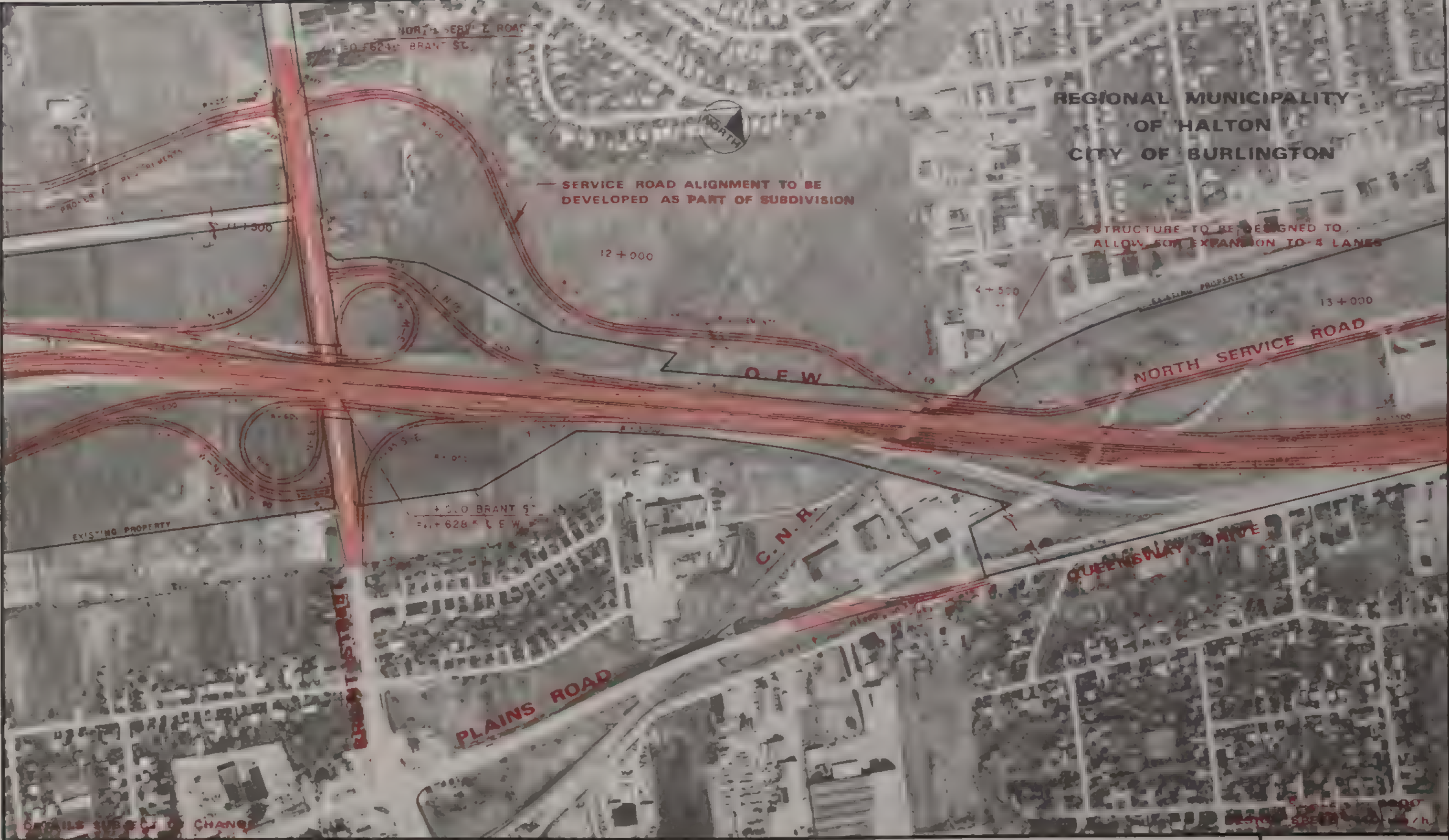
29

STAGE 3

QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON



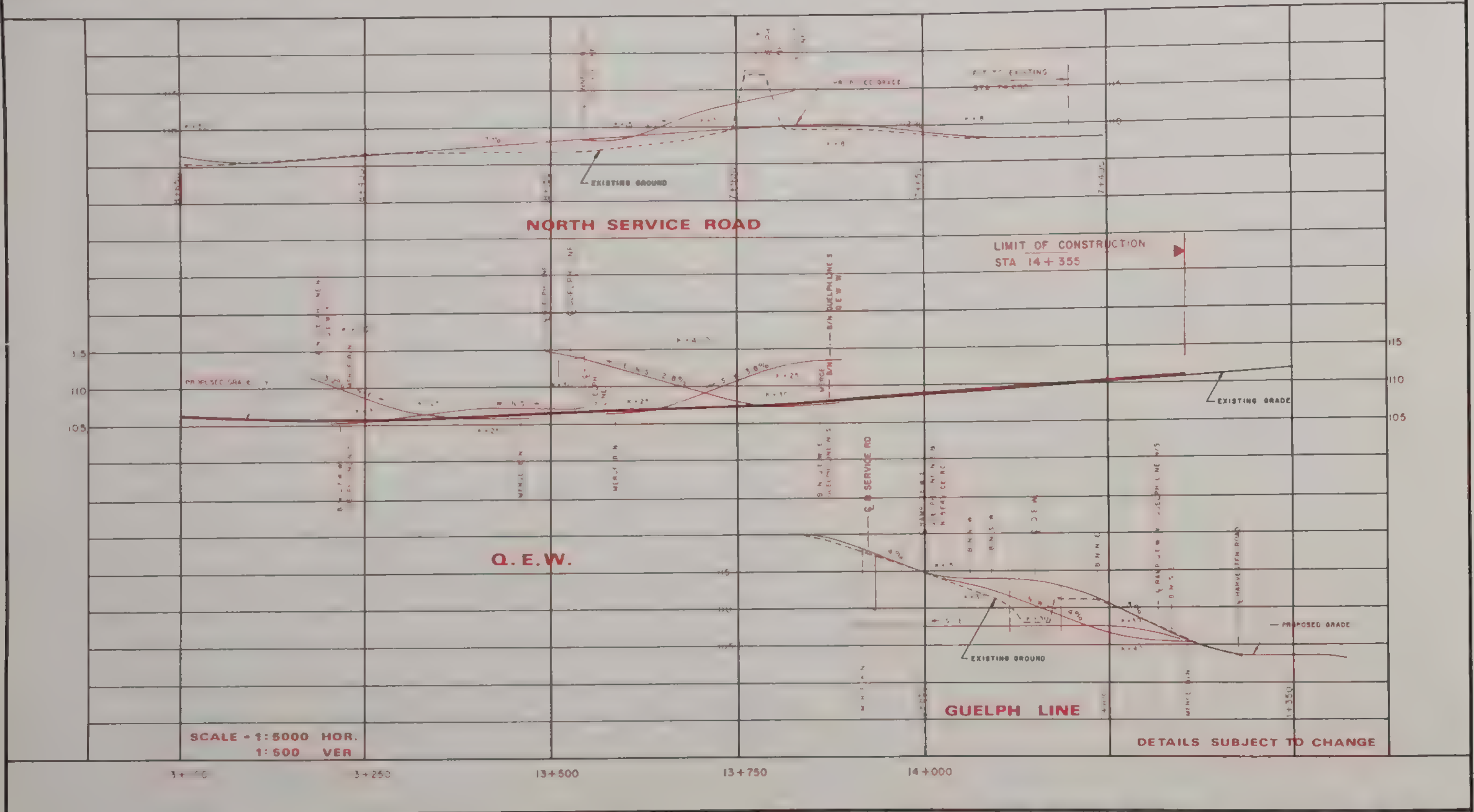


QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

30

STAGE 3

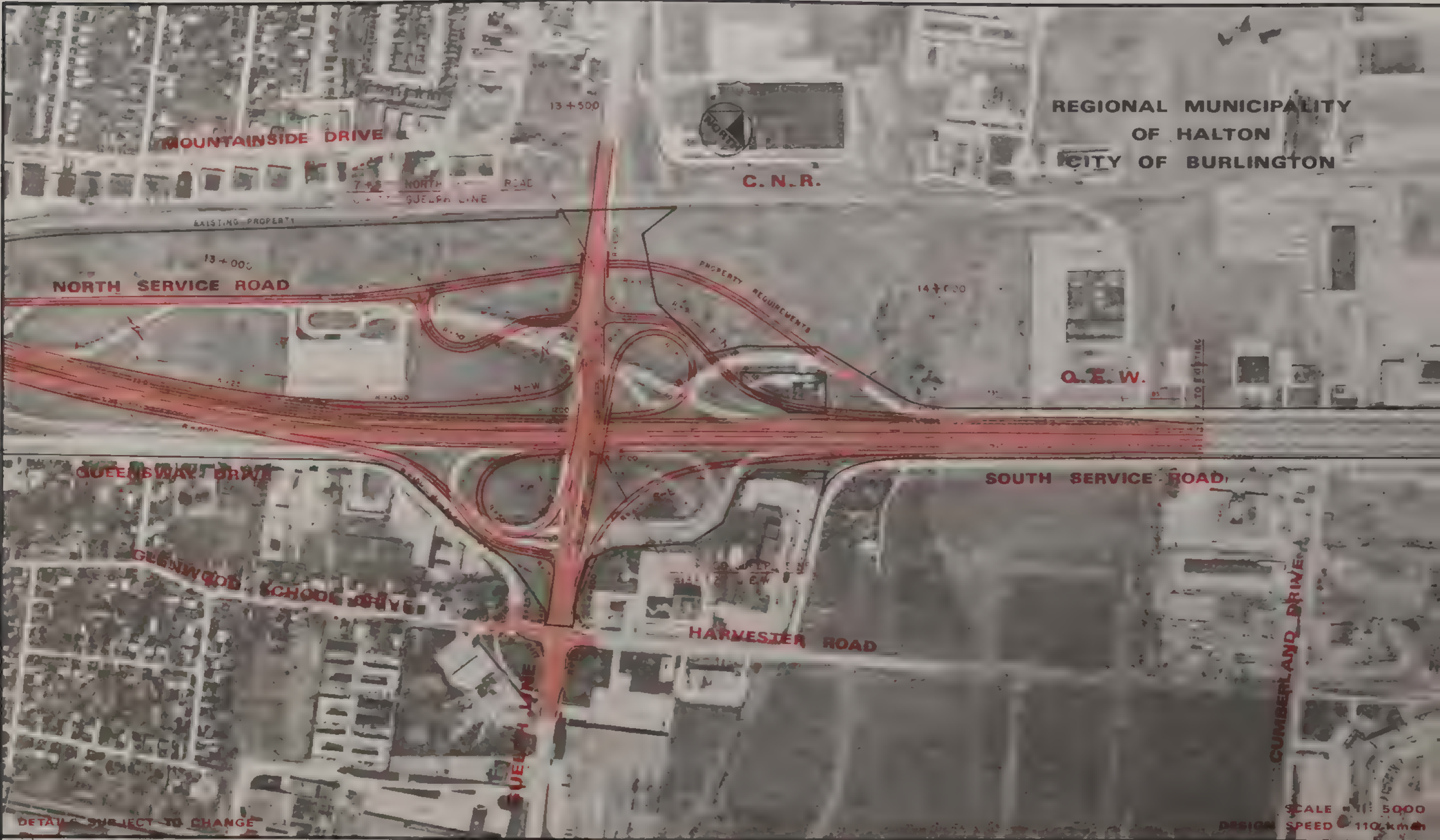


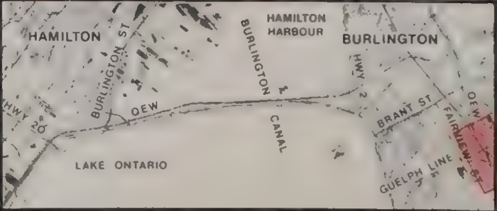
31

STAGE 3

QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON



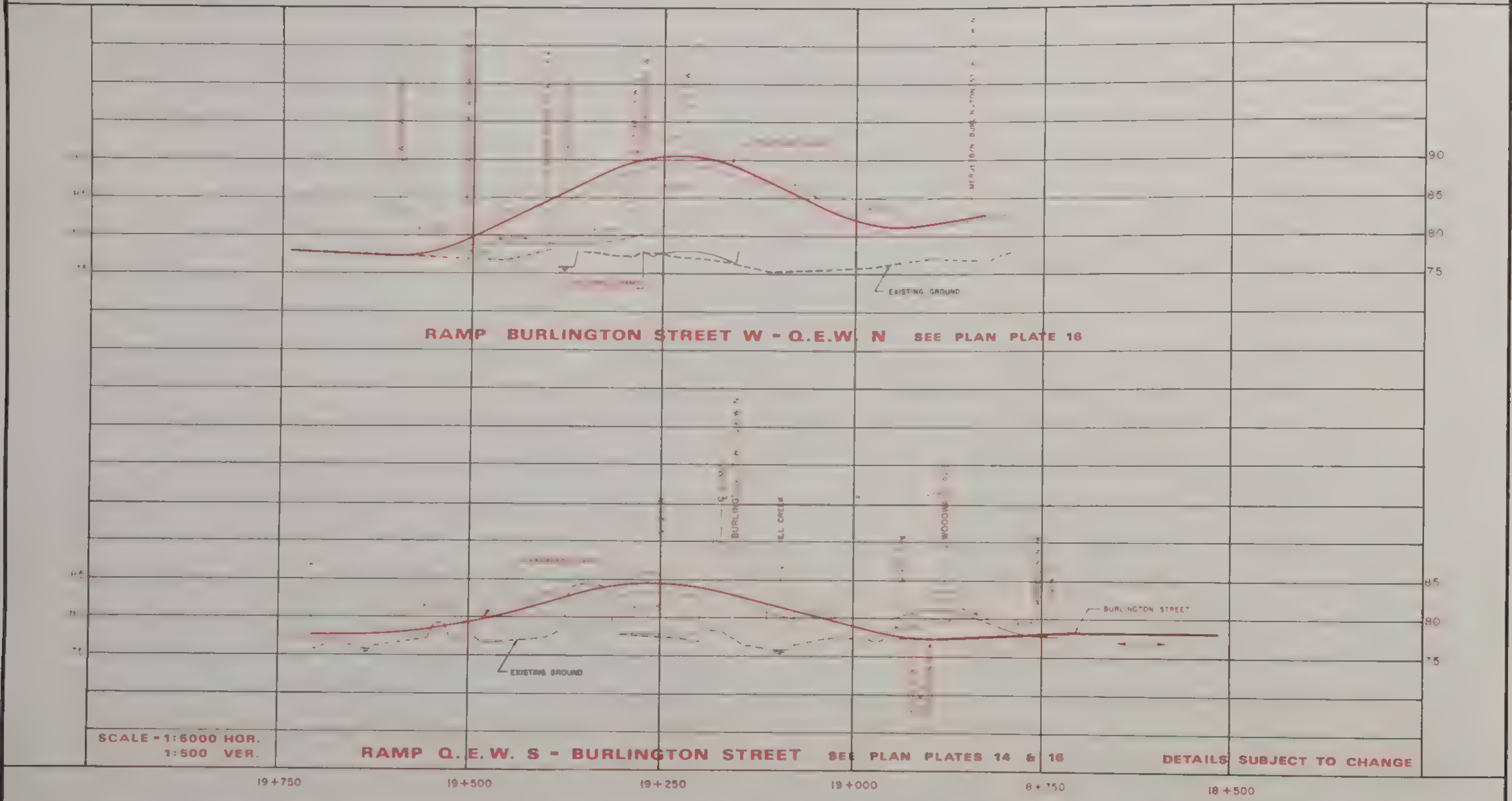


QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

32

STAGE 3


RAMP BURLINGTON STREET W - Q.E.W. N SEE PLAN PLATE 16

RAMP Q.E.W. S - BURLINGTON STREET SEE PLAN PLATES 14 & 16

SCALE - 1:5000 HOR.
1:500 VER.

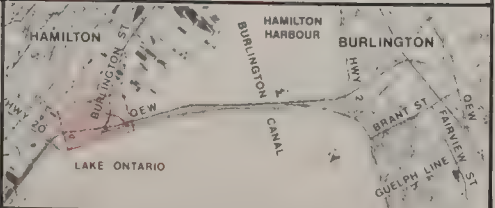
DETAILS SUBJECT TO CHANGE

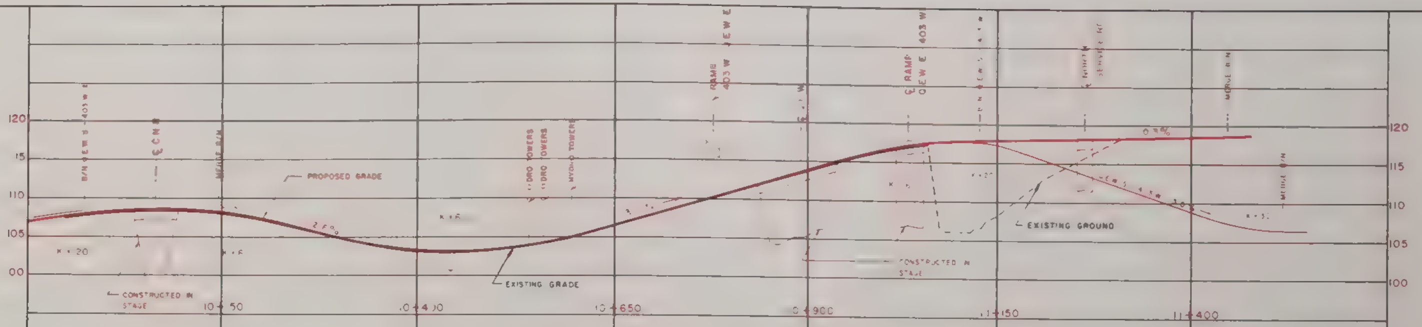
33

STAGE 3

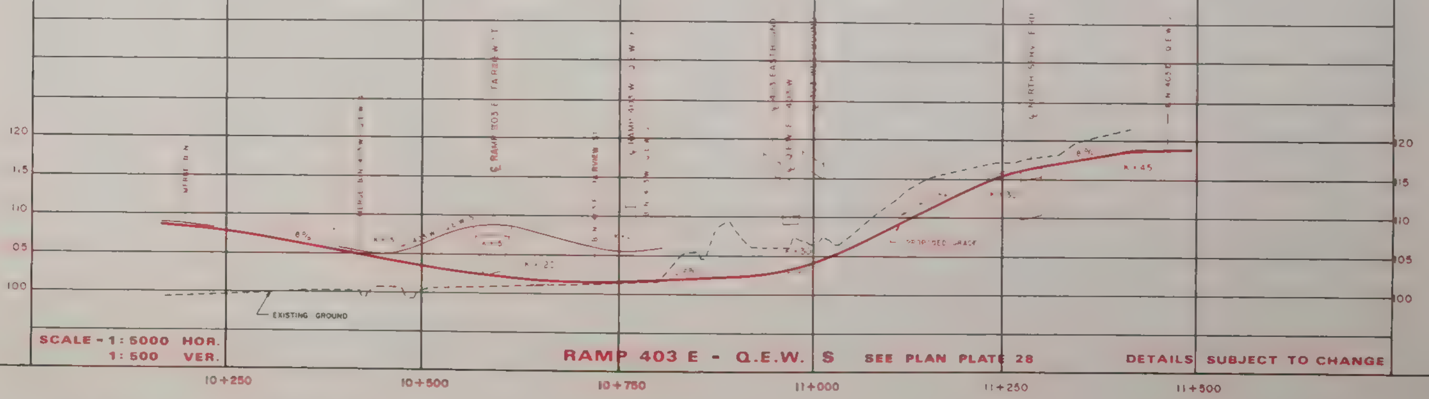
QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON





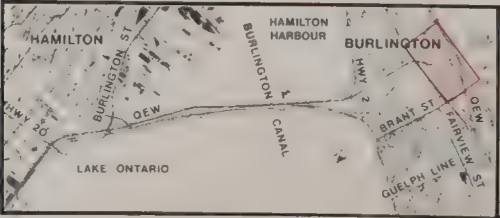
RAMP Q.E.W. S - 403 SEE PLAN PLATE 26 & 28



SCALE - 1 : 5000 HOR.
1 : 500 VER.

RAMP 403 E - Q.E.W. S SEE PLAN PLATE 28

DETAILS SUBJECT TO CHANGE

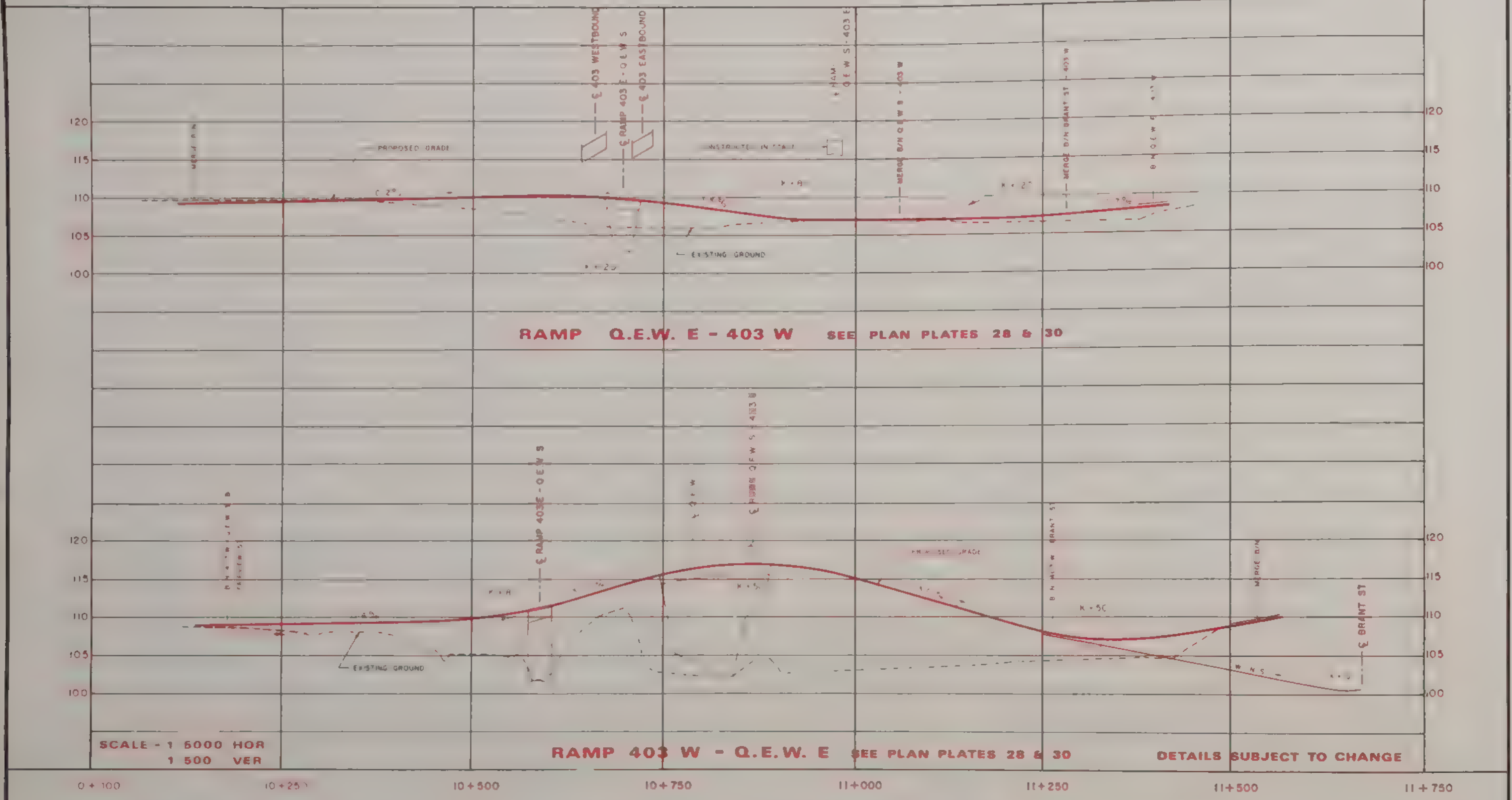


QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

34

STAGE 3


RAMP Q.E.W. E - 403 W SEE PLAN PLATES 28 & 30

RAMP 403 W - Q.E.W. E SEE PLAN PLATES 28 & 30

DETAILS SUBJECT TO CHANGE

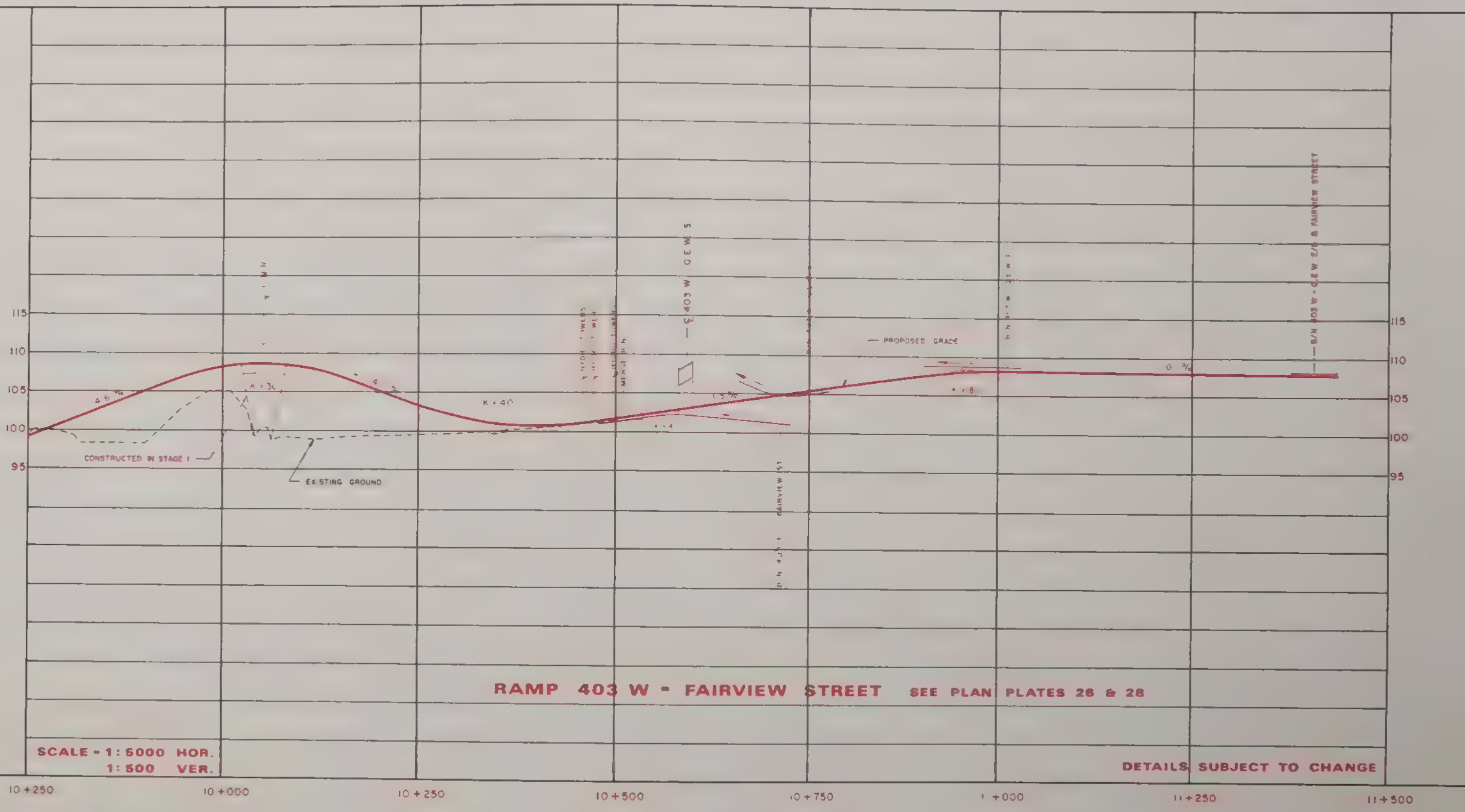
SCALE - 1 5000 HOR
1 500 VER

35

STAGE 3

QUEEN ELIZABETH WAY

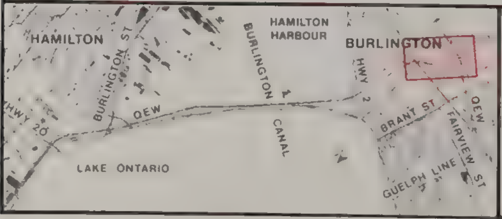
BURLINGTON TO HAMILTON



RAMP 403 W - FAIRVIEW STREET SEE PLAN PLATES 26 & 28

SCALE - 1 : 5000 HOR.
1 : 500 VER.

DETAILS SUBJECT TO CHANGE



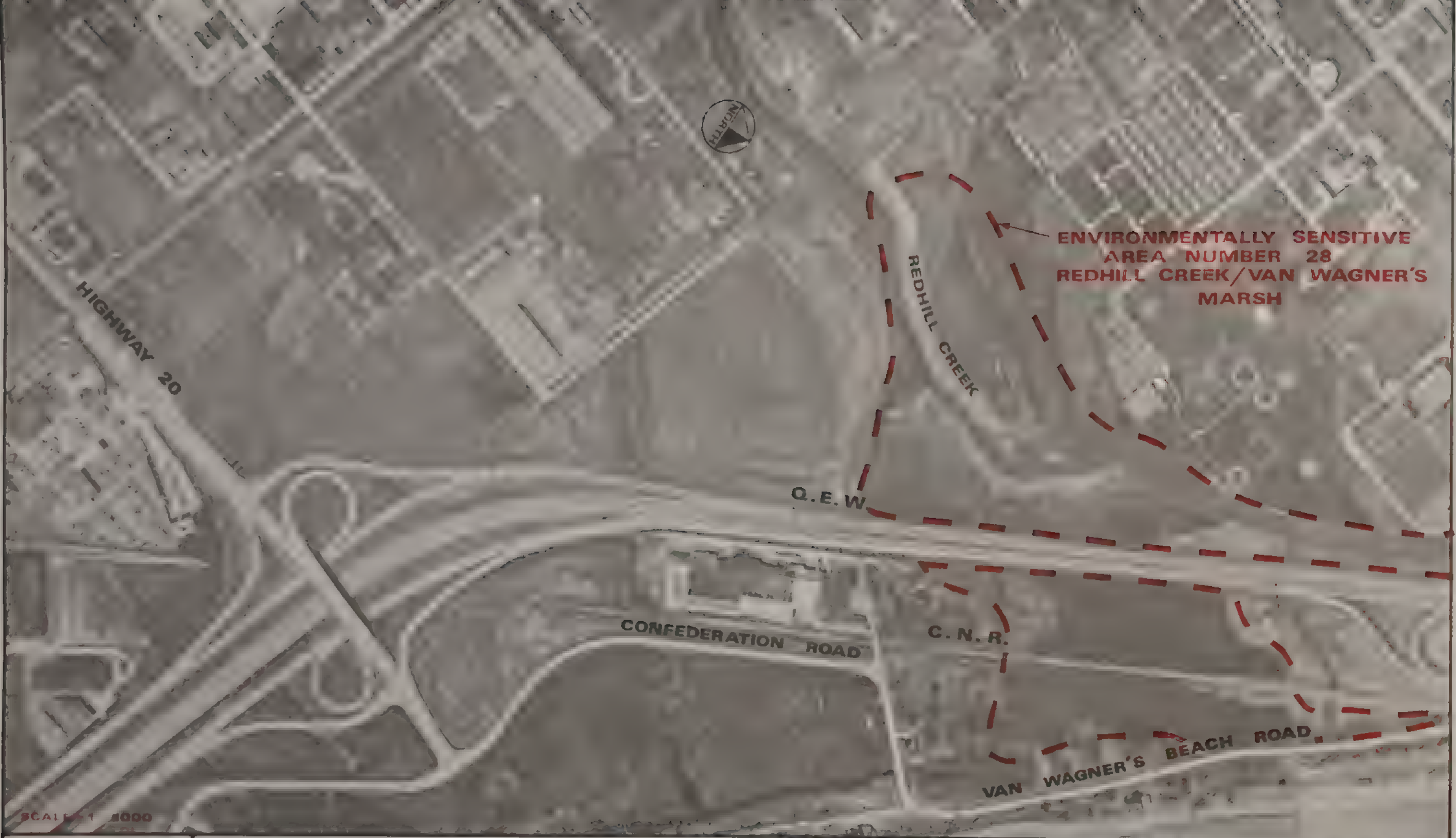
QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

36

STAGE 3

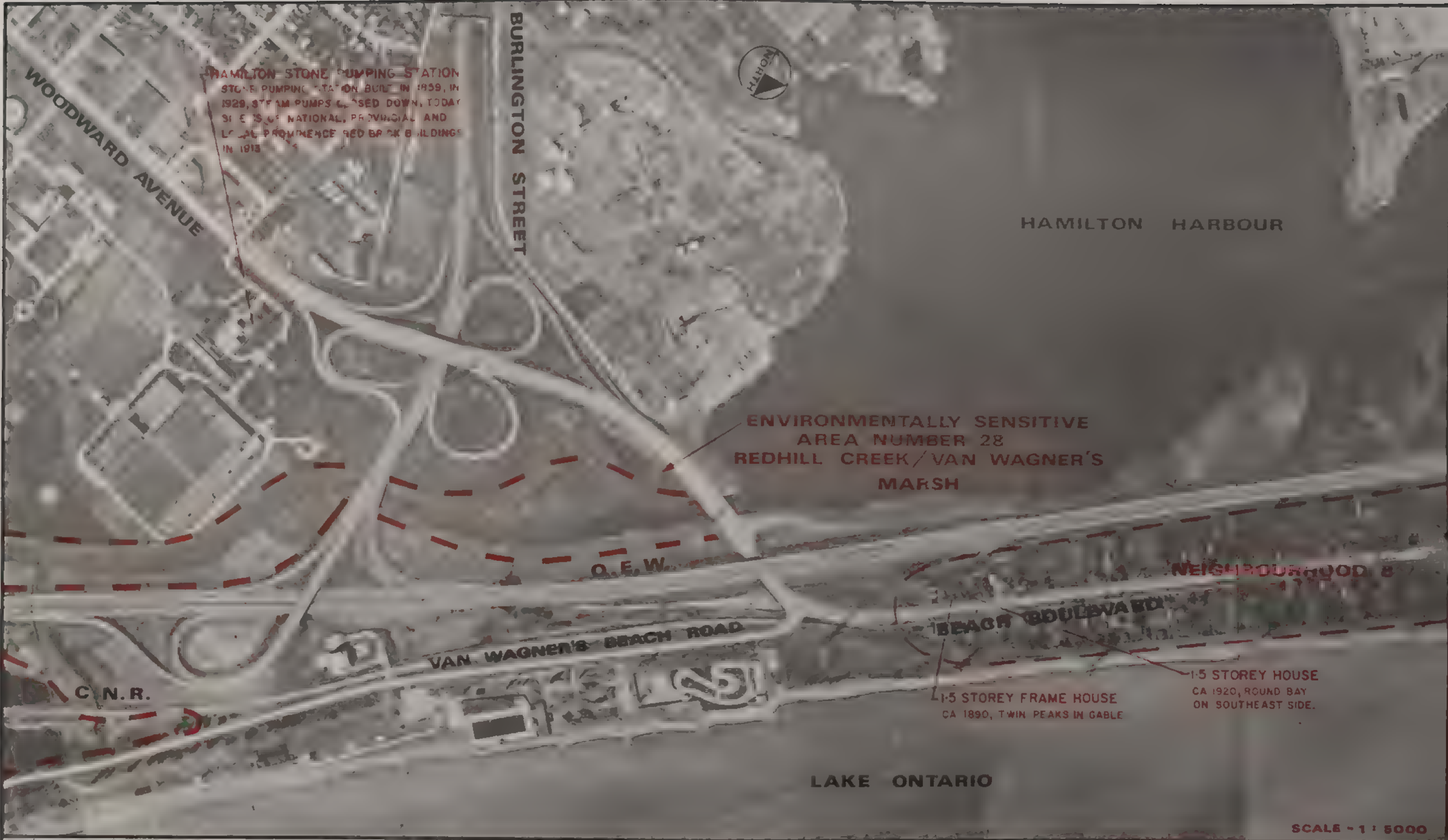
APPENDIX J – Environmental Data Plates



1

QUEEN ELIZABETH WAY

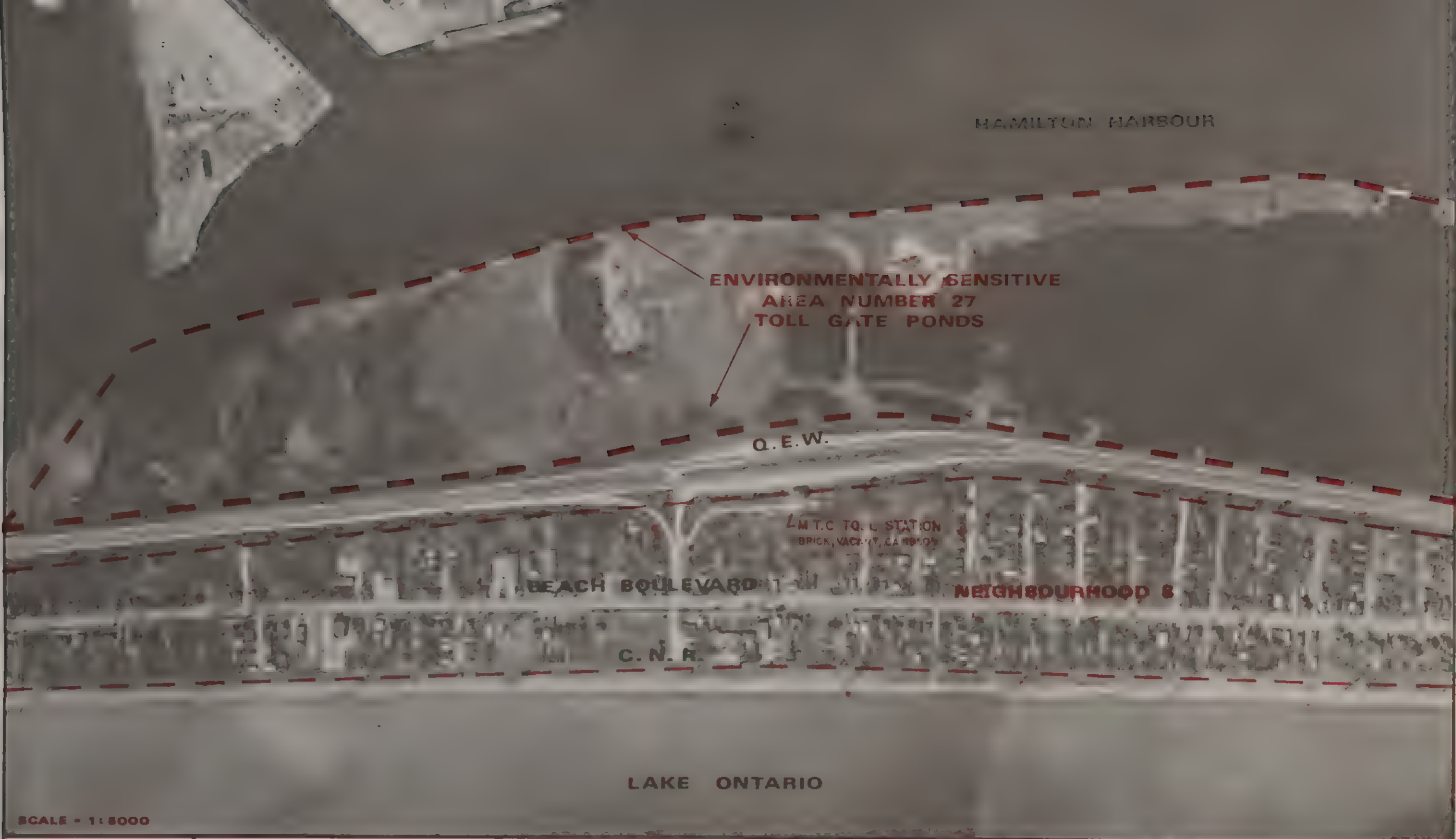
BURLINGTON TO HAMILTON


WOODWARD AVENUE
BURLINGTON STREET
NORTH
HAMILTON STONE PUMPING STATION
STONE PUMPING STATION BUILT IN 1859, IN 1929, STEAM PUMPS CLOSED DOWN, TODAY SITE IS OF NATIONAL, PROVINCIAL AND LOCAL PROMINENCE RED BRICK BUILDINGS IN 1913
HAMILTON HARBOUR
ENVIRONMENTALLY SENSITIVE AREA NUMBER 28 REDHILL CREEK / VAN WAGNER'S MARSH
Q.E.W.
NEIGHBOURHOOD 8
BEACH BOULEVARD
VAN WAGNER'S BEACH ROAD
C.N.R.
1·5 STOREY FRAME HOUSE
CA 1890, TWIN PEAKS IN GABLE
1·5 STOREY HOUSE
CA 1920, ROUND BAY ON SOUTHEAST SIDE.
LAKE ONTARIO
SCALE - 1 : 5000

QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

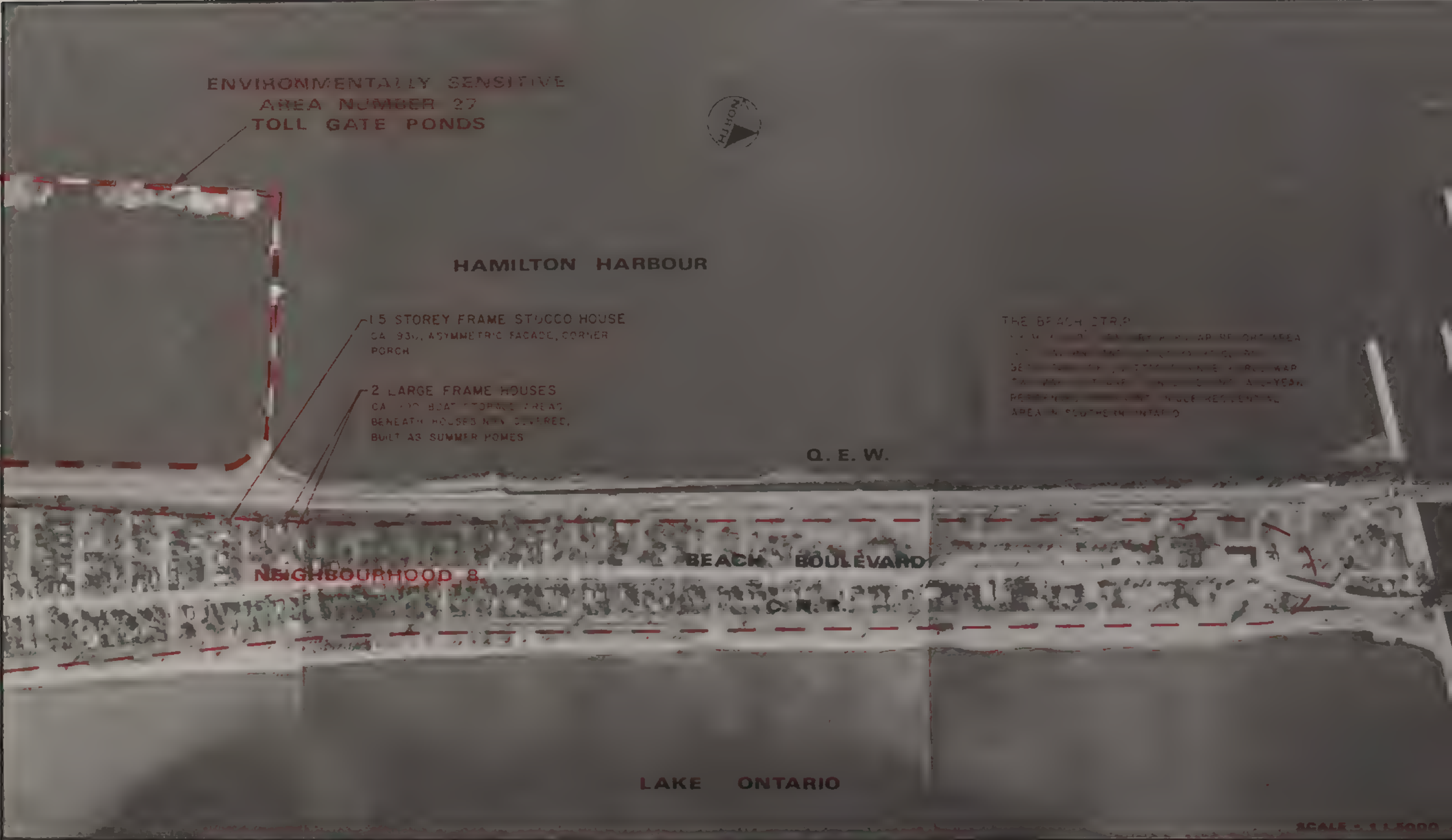
2

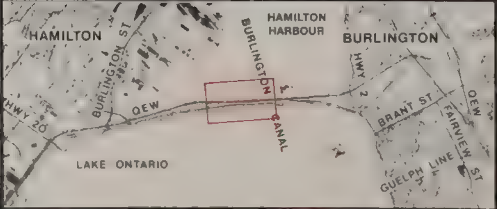


3

QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

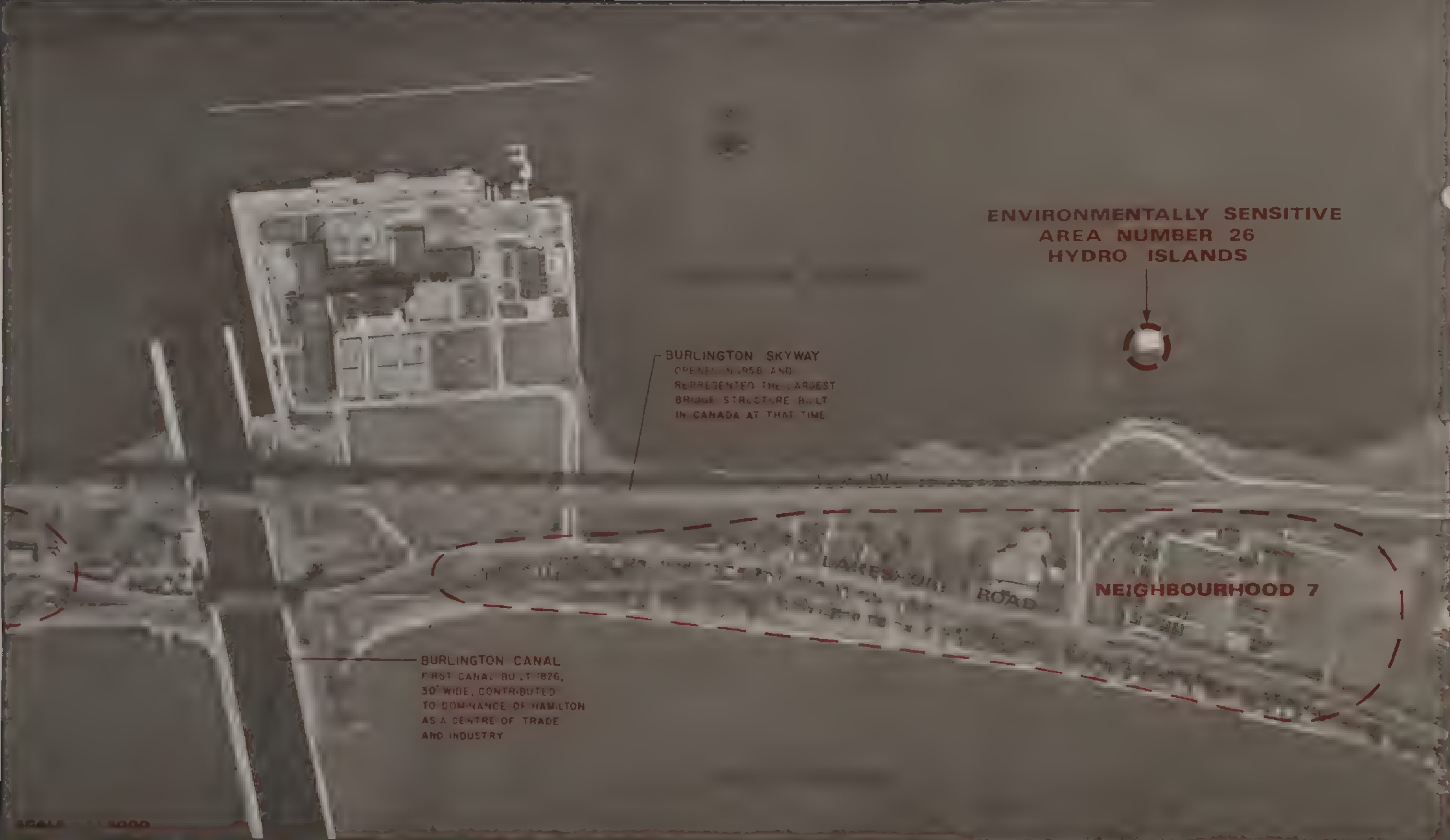




QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

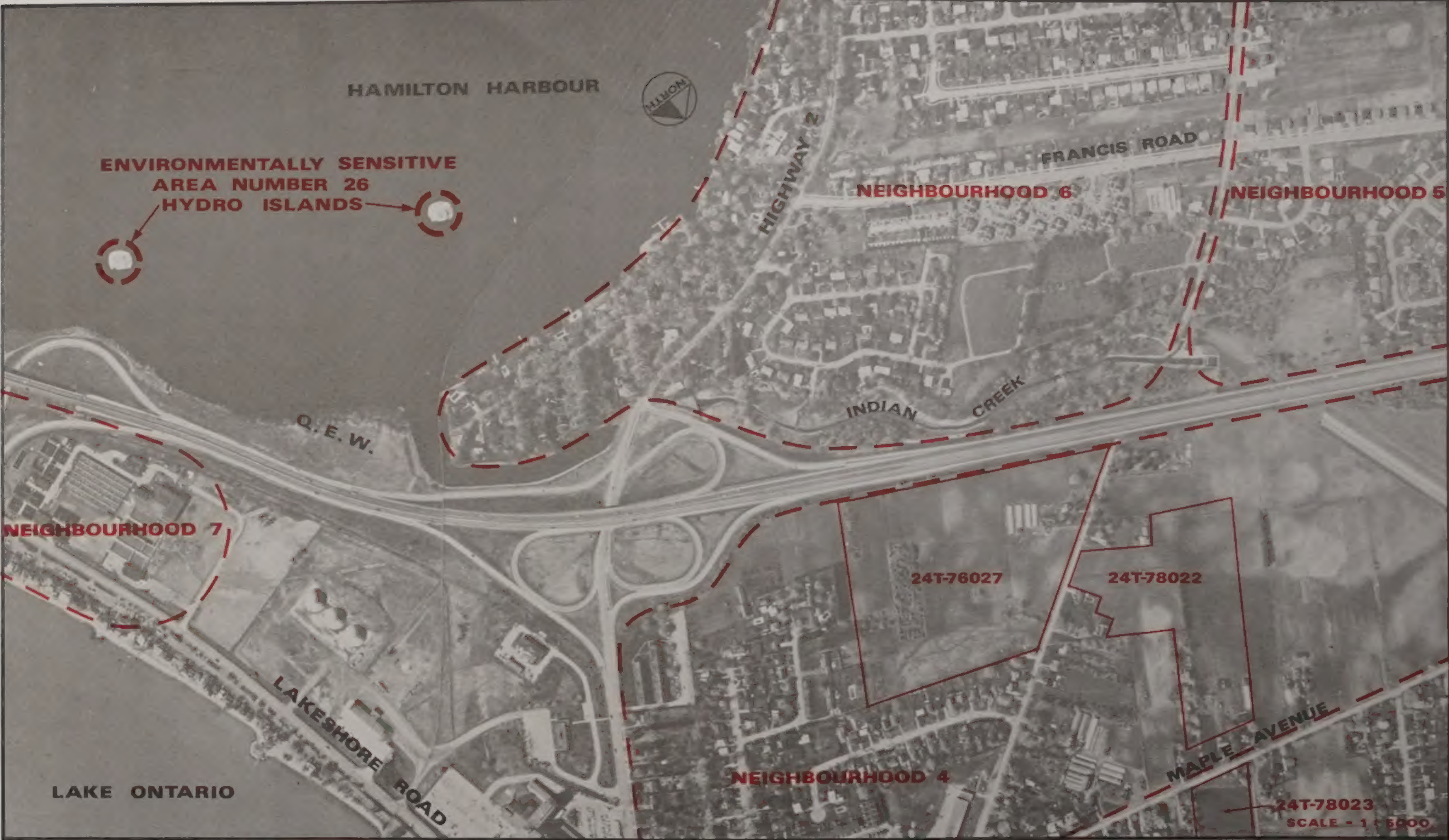
4



5

QUEEN ELIZABETH WAY

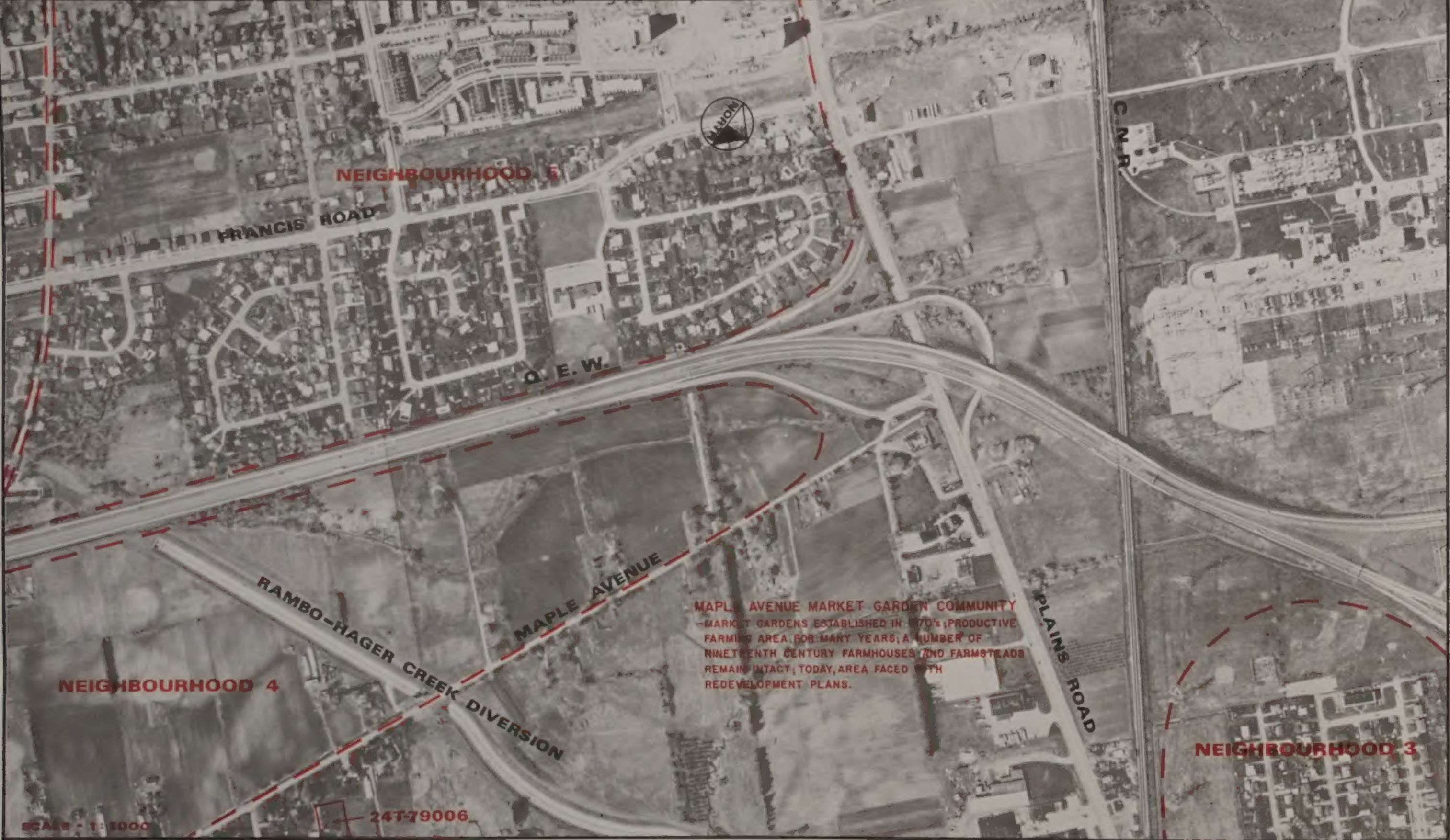
BURLINGTON TO HAMILTON



QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

6

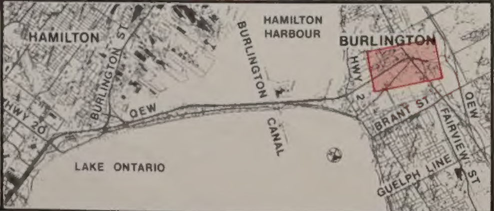


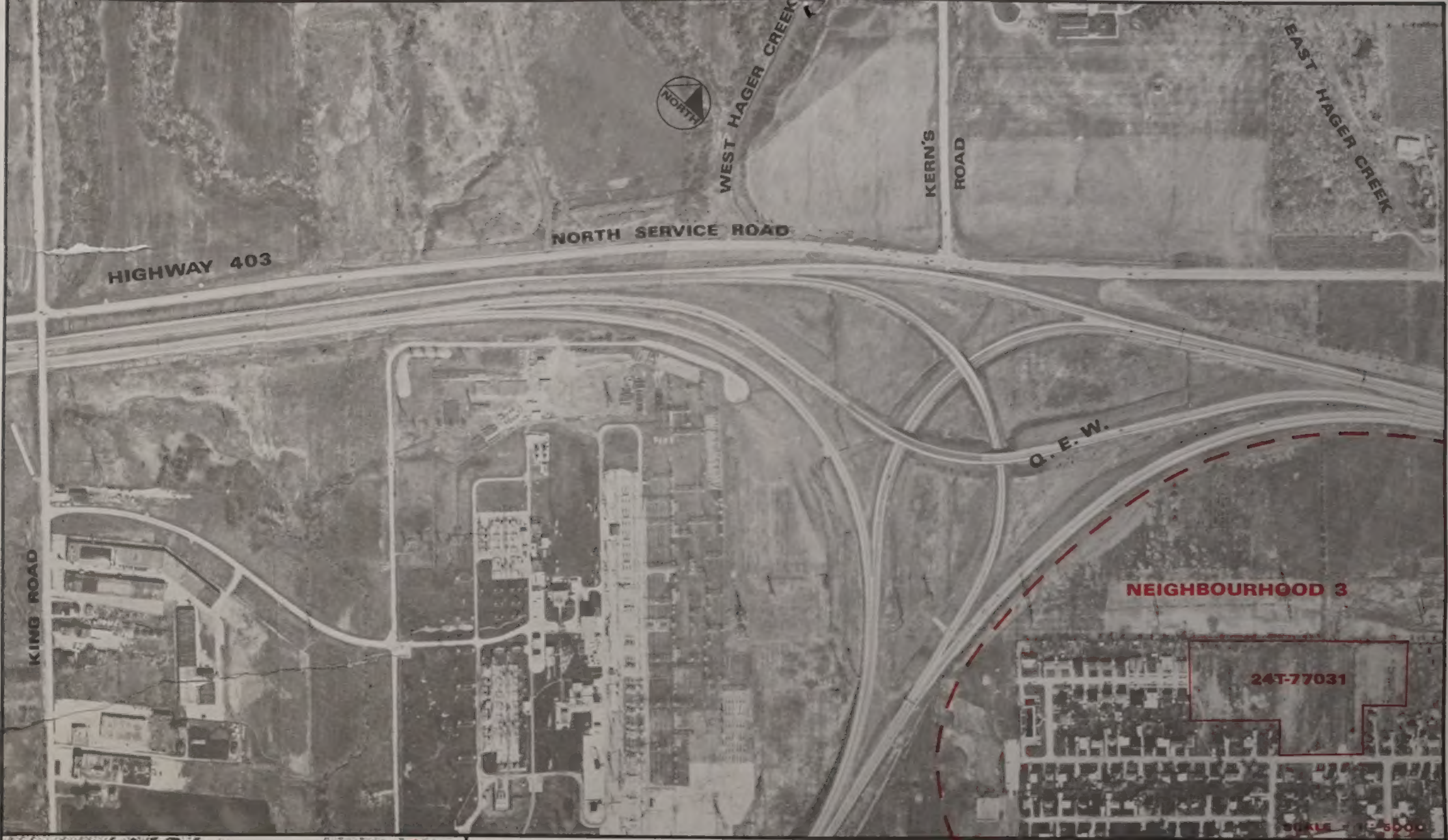
MAPLE AVENUE MARKET GARDEN COMMUNITY
-MARKET GARDENS ESTABLISHED IN [illegible]70's; PRODUCTIVE FARMING AREA FOR MANY YEARS; A NUMBER OF NINETEENTH CENTURY FARMHOUSES AND FARMSTEADS REMAIN INTACT; TODAY, AREA FACED WITH REDEVELOPMENT PLANS.

7

QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

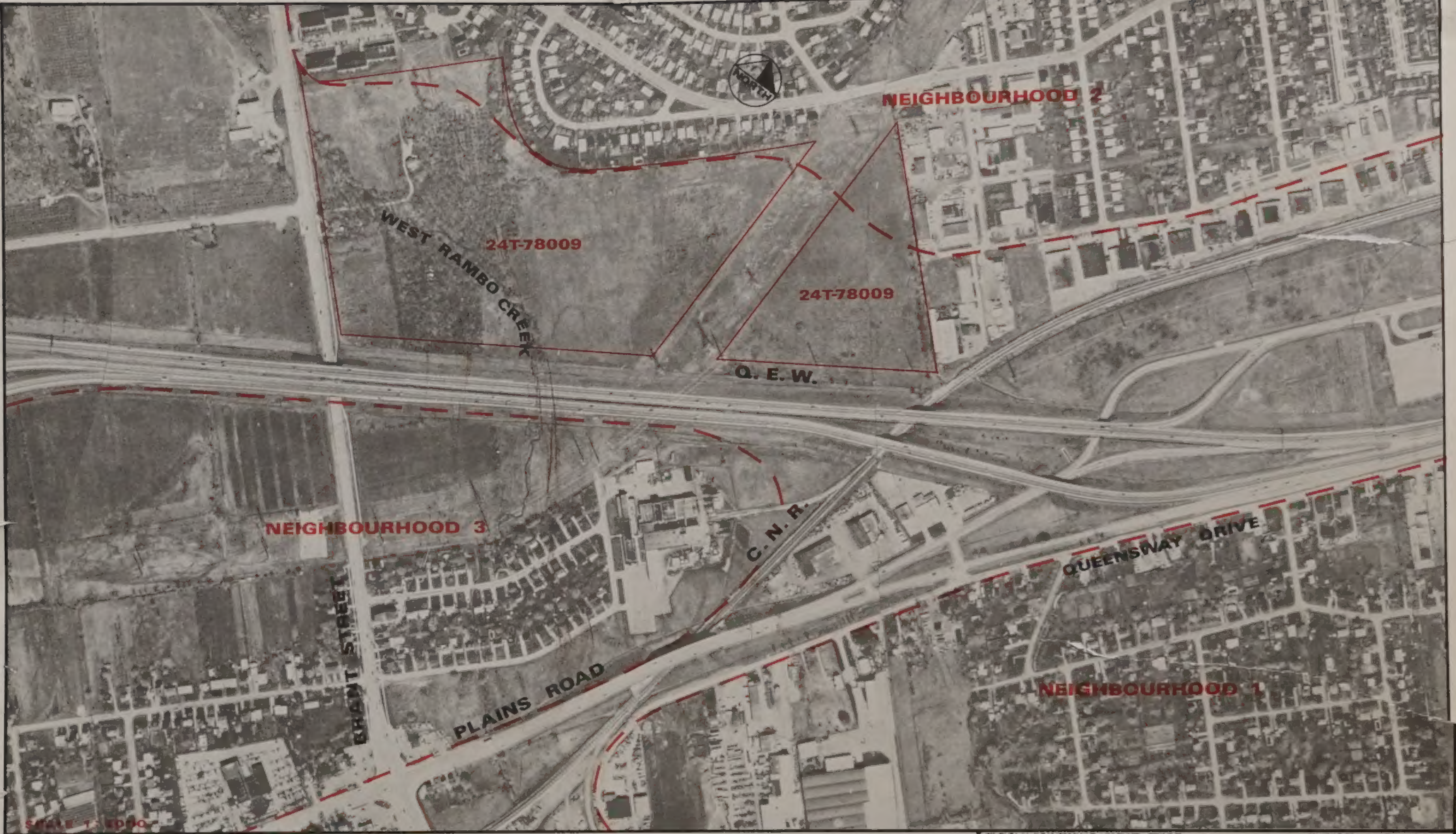




QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON

8



9

QUEEN ELIZABETH WAY

BURLINGTON TO HAMILTON